



**WEST VIRGINIA SECRETARY OF STATE**

**MAC WARNER**

**ADMINISTRATIVE LAW DIVISION**

**eFILED**

2/17/2022 12:03:00 PM

Office of West Virginia  
Secretary Of State

**NOTICE OF PUBLIC COMMENT PERIOD**

AGENCY: Coal Mine Health And Safety TITLE-SERIES: 36-23  
RULE TYPE: Legislative Exempt Amendment to Existing Rule: Yes Repeal of existing rule: No  
RULE NAME: Surface Construction Operations Within the Coal Mining Industry of the State of West Virginia  
CITE STATUTORY AUTHORITY: W. Va. Code 22A-6-4 and 22A-6-5

**COMMENTS LIMITED TO:**

Written

**DATE OF PUBLIC HEARING:**

**LOCATION OF PUBLIC HEARING:**

**DATE WRITTEN COMMENT PERIOD ENDS:** 04/04/2022 5:00 PM

**COMMENTS MAY BE MAILED OR EMAILED TO:**

NAME: Mallory Yates Hicks  
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Charleston, WV 25311  
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**PLEASE INDICATE IF THIS FILING INCLUDES:**

**RELEVANT FEDERAL STATUTES OR REGULATIONS:** No

(IF YES, PLEASE UPLOAD IN THE SUPPORTING DOCUMENTS FIELD)

**INCORPORATED BY REFERENCE:** No

(IF YES, PLEASE UPLOAD IN THE SUPPORTING DOCUMENTS FIELD)

PROVIDE A BRIEF SUMMARY OF THE CONTENT OF THE RULE:

The rule was originally promulgated in response to a multiple mine fatality involving contractors. The rule relies on several Occupational Safety and Health Administration (OSHA) rules governing construction along with mining specific standards to address hazards specific to the mining industry.

SUMMARIZE IN A CLEAR AND CONCISE MANNER CONTENTS OF CHANGES IN THE RULE AND A STATEMENT OF CIRCUMSTANCES REQUIRING THE RULE:

Pursuant to the regulatory review and reform initiatives established in W. Va. Code §29A-3-20 (2016) and Executive Order No. 3-18, this proposed rule modifies and updates 36 C.S.R. 23 to cross-reference the correct authorizing portions of the West Virginia Code and corrects typographical errors in paragraph numbering. References to flame safety lamp were changed to an approved detector.

In addition the following subject areas were updated to coincide with current OSHA construction and/or State standards: electrical; stairways, ladders and scaffolding; excavations, trenching and shoring; concrete and masonry construction; steel erection; demolition; blasting and the use of explosives; fall protection; and cranes and derricks in construction.

SUMMARIZE IN A CLEAR AND CONCISE MANNER THE OVERALL ECONOMIC IMPACT OF THE PROPOSED RULE:

A. ECONOMIC IMPACT ON REVENUES OF STATE GOVERNMENT:

This proposed legislative-exempt rule is not anticipated to impact the revenues of state government.

B. ECONOMIC IMPACT ON SPECIAL REVENUE ACCOUNTS:

This proposed legislative-exempt rule is not anticipated to impact special revenue accounts.

C. ECONOMIC IMPACT OF THE RULE ON THE STATE OR ITS RESIDENTS:

This proposed legislative-exempt rule is not anticipated to impact the state or its residents.

D. FISCAL NOTE DETAIL:

Effect of Proposal	Fiscal Year		
	2022 Increase/Decrease (use "-")	2023 Increase/Decrease (use "-")	Fiscal Year (Upon Full Implementation)
1. Estimated Total Cost	0.00	0.00	0.00
Personal Services	0.00	0.00	0.00
Current Expenses	0.00	0.00	0.00
Repairs and Alterations	0.00	0.00	0.00
Assets	0.00	0.00	0.00
Other	0.00	0.00	0.00
2. Estimated Total Revenues	0.00	0.00	0.00

E. EXPLANATION OF ABOVE ESTIMATES (INCLUDING LONG-RANGE EFFECT):

N/A

BY CHOOSING 'YES', I ATTEST THAT THE PREVIOUS STATEMENT IS TRUE AND CORRECT.

Yes

James Bailey -- By my signature, I certify that I am the person authorized to file legislative rules, in accordance with West Virginia Code §29A-3-11 and §39A-3-2.

TITLE 36  
LEGISLATIVE EXEMPT RULE  
BOARD OF COAL MINE HEALTH AND SAFETY

SERIES 23  
~~RULES AND REGULATIONS GOVERNING SURFACE CONSTRUCTION~~  
OPERATIONS WITHIN THE COAL MINING INDUSTRY  
~~WITHIN OF~~ THE STATE OF WEST VIRGINIA

**§36-23-1. General.**

1.1. Scope. -- Rules and regulations governing surface construction operations within the coal mining industry within the State of West Virginia.

1.2. Authority. -- W. Va. Code ~~§22-4-6~~ §§22A-6-4 and 22A-6-5.

1.3. Filing Date. -- ~~January 9, 1995~~ \_\_\_\_\_.

1.4. Effective Date. -- ~~July 1, 1995~~ \_\_\_\_\_.

**§36-23-2. Effect of Regulations.**

2.1. All provisions of the mining laws of this state intended to safeguard life or property shall extend to all construction operations insofar as such laws are applicable thereto.

2.2. 2-1: These rules and regulations This rule shall have the effect of law, and violations shall be deemed a violation of law and so cited with the same effect as law. All provisions of Article 1A, Chapter 22A of the Code relative to enforcement are applicable to the enforcement of these rules and regulations W. Va. Code §22A-1-1 et seq. relative to enforcement are applicable to the enforcement of this rule.

**§36-23-3. Definitions.**

3.1. All terms in this rule, not defined herein, shall have the meanings set forth in W. Va. Code §22A-1-2 et seq. Unless the context in which used clearly requires a different meaning, the following definitions shall apply to these rules and regulations:

3.1.1. 3-1: "Accident". ~~--- The term "accident"~~ shall mean any explosion, ignition, fire, or inundation, or injury to, or death of any person at the surface construction project.

3.1.2. 3-2: "Agent". ~~--- The term "agent" shall mean~~ means any person charged with the responsibility for the operation of all or a part of a surface construction project or the supervision of the employees at the surface construction project.

3.1.3. 3-3: "ANSI" ~~--- Means~~ shall mean the American National Standards Institute.

3.1.4. 3-4: "Approved". ~~--- The term "approved"~~ shall mean in strict compliance with the mining law, or in the absence of law, accepted by a recognized standardizing body or organization whose approval is generally recognized as authoritative on the subject.

3.1.5. 3-5: "Authorized person". ~~--- Means~~ shall mean a person assigned by the employer to perform

a specific type of duty or duties or to be at a specific location or locations at the job site.

~~3.6. Board of Appeals. -- The term "Board of Appeals" shall mean as provided for in Section 1 of Chapter 22, Article 5, of the Code.~~

~~3.1.6. 3-7: "Competent person". -- Means shall mean~~ one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

~~3.1.7. 3-8: "Construction work". -- Means shall mean~~ the building, rebuilding, alteration, or demolition of any facility or addition to existing facility at a surface mine or surface area of an underground mine, including painting, decoration or restoration associated with such work, and the excavation of land connected therewith, but excluding shaft and slope sinking and work performed on the surface incidental to shaft or slope sinking.

~~3.1.8. 3-9: "Defect". -- Means shall mean~~ any characteristic or condition which tends to weaken or reduce the strength of a tool, object, or structure of which it is a part.

~~3.1.9. 3-10: "Department". -- The term "department" shall mean the Office of Miners' Health, Safety and Training provided for in Section 3 of Chapter 2A, Article 1A of the Code W. Va. Code §22A-1-1.~~

~~3.11. Designated person. -- Means "authorized person" as defined in paragraph 3.5 of this section.~~

~~3.1.10. 3-12: "Director" of Office of Miners' Health, Safety and Training. -- The term "Director of Office of Miners' Health, Safety and Training" shall mean the Director of the Office of Miners' Health, Safety and Training provided for in Section 3 of Chapter 22A, Article 1A, of the Code W. Va. Code §22A-1-3.~~

~~3.1.11. 3-13: "Employee". -- Means shall mean~~ a person employed by the employer at a surface construction project.

~~3.1.12. 3-14: "Employer". -- Means shall mean~~ an operator or agent which employs employees at a surface construction project.

~~3.1.13. 3-15: "Foreman". -- The term "foreman" shall mean~~ a person whom the employer or superintendent shall place in charge of employees at a construction project.

~~3.16. Hazardous substance. -- Means a substance which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful, is likely to cause death or injury.~~

~~3.1.14. 3-17: "Imminent danger". -- The term "imminent danger" shall mean means~~ the existence of any condition or practice at a surface construction project which could reasonably be expected to cause death or serious physical harm before such condition or practice can be abated.

~~3.1.15. 3-18: "Mine". -- The term "mine" shall include includes~~ the shafts, slopes, drifts or inclines connected with, or intended in the future to be connected with, excavations penetrating coal seams or strata, which excavations are ventilated by one general air current or divisions thereof, and connected by one general system of mine haulage over which coal may be delivered to one (1) or more points outside the mine, and the surface structures or equipment connected or associated therewith which contribute directly or indirectly to the mining, preparation or handling of coal, or construction thereof.

~~3.19. Mine Inspector. -- The term "mine inspector" shall mean a state mine inspector provided for in Section 7 of Chapter 22A, Article 1A, of the Code.~~

~~3.20. Mine Inspectors' Examining Board. -- The term "Mine Inspectors' Examining Board" shall mean the Mine Inspectors' Examining Board provided for in Section 1 of Chapter 22, Article 11, of the Code.~~

~~3.1.16. 3.21. "Operator".-- The term "operator" shall mean any firm, corporation, partnership or individual operating any coal mine or part thereof, or engaged in the construction of any facility associated with a coal mine.~~

3.1.17. "OSHA" shall mean the Federal Occupational Safety and Health Administration.

~~3.1.18. 3.22. "Production Operator".-- shall Shall~~ mean any owner, lessee, or other person who operates, controls, or supervises a coal mine.

~~3.1.19. 3.23. "Qualified".-- shall mean Means~~ one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, the work or the project.

~~3.1.20. 3.24. "SAE".-- shall mean Means~~ Society of ~~Automotive~~ Automotive Engineers.

~~3.1.21. 3.25. "Safety factor".-- shall mean Means~~ the ratio of the ultimate breaking strength of a member or piece of material or equipment to the actual working stress or safe load when in use.

~~3.1.22. 3.26. "Shall".--shall mean Means~~ mandatory.

~~3.1.23. 3.27. "Should".-- shall mean Means~~ recommended.

~~3.1.24. 3.28. "Suitable".-- shall mean Means~~ that which fits and has the qualities or qualifications to meet a given purpose, occasion, condition, function, or circumstances.

~~3.1.25. 3.29. "Superintendent".-- The term "superintendent" shall mean the person in charge of a surface construction project.~~

~~3.1.26. 3.30. "Supervisor".-- The term "supervisor" shall mean a superintendent, foreman, assistant foreman, or any person specifically designated by the employer to supervise work or employees and who is acting pursuant to such specific designation and instructions.~~

~~3.1.27. 3.31. "Surface construction worker".-- The term "surface construction worker" shall mean means~~ "employee" as defined in ~~paragraph~~ Subsection 3.1.11.

~~3.1.28. 3.32. "Surface construction project".-- The term "surface construction project" shall mean any construction work being performed on the surface of any underground coal mine or surface coal mine by an employer, but shall not include any work performed on the surface incidental to shaft or slope sinking.~~

#### **§36-23-4. General Accident Prevention.**

4.1. The employer shall initiate programs which provide for frequent and regular safety inspections of surface construction project sites, materials, and equipment by competent persons designated by the

employer.

4.2. The use of any machine, tool, material or equipment which is not in compliance with any applicable requirement of this ~~part~~ rule is prohibited. Such machine, tool, material, or equipment shall either be identified as unsafe by tagging or locking the controls to render ~~them~~ it inoperable or shall be physically removed from its place of operation. Mobile equipment operators shall exercise reasonable care in the operation of the equipment entrusted to them and shall promptly report defects to the employer.

4.3. The employer shall permit only qualified employees to operate equipment and machinery.

#### **§36-23-5. Housekeeping.**

5.1. During the course of construction, alteration or repairs, form and scrap lumber with protruding nails and all other debris shall be kept cleared from work areas, passageways, and stairs, in and around buildings or other structures.

5.2. Combustible scrap and debris shall be safely removed at regular intervals during the course of construction.

5.3. Containers shall be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes, such as caustics or acids, shall be equipped with covers. Garbage and other wastes shall be disposed of at frequent and regular intervals.

#### **§36-23-6. Pressure Vessels.**

6.1. Current and valid certification by ~~an insurance company or~~ a regulatory authority shall be deemed as acceptable evidence of safe installation, inspection, and testing of pressure vessels provided by the employer.

#### **§36-23-7. Employment of Certified Supervisor.**

7.1. The employer shall designate at least one (1) certified construction supervisor for each surface construction project at each specific mine where the employer employs ten (10) or more employees or at least one (1) competent person is designated for each surface construction project to perform the duties required of the certified construction ~~foreman~~ supervisor at each site employing less than ten (10) persons.

#### **§36-23-8. Construction Supervisor Certification.**

8.1. Construction supervisor certification shall be issued to an applicant upon verification that the applicant has three (3) or more years experience in surface construction work. Information relating to work experience shall be sworn to by the applicant and verified by the employer, or employers, for which the work was performed.

~~8.2. All supervisors who are or have been employed as such on construction work on or prior to the effective date of these regulations shall be granted certification upon request of the employer, or employers, for which the work was performed.~~

8.2. ~~8.3.~~ Any person holding a construction supervisor certification issued by any other state may act in the capacity of a certified construction supervisor at any surface construction project in this state for a

period not to exceed ninety (90) days.

### **§36-23-9. Duties of Certified Supervisor or Competent Person.**

9.1. The supervisor or competent person shall examine within the first four (4) hours of a working shift the working places of a construction project for unsafe working conditions and make sure appropriate action is taken to either correct, or prevent exposure of employees to, unsafe conditions.

9.2. The results of such examination shall be recorded in a prescribed book approved by the Director. The supervisor or competent person shall make sure that reasonable action is taken to abate the violation of any rule or regulation which comes to his/her attention, provided nothing herein shall prevent an employer from contesting an alleged violation. The production operator will receive written documentation of the results of the examination required in Section 9.1. within twenty-four (24) hours of the end of each shift. The documentation will show when the examination was made, conditions found and action taken. All records as prescribed herein shall be open for inspection by interested persons and maintained for at least one (1) year.

9.3. The supervisor or competent person shall make sure that all notices required by a rule or regulation are properly posted, and that a copy of the rules ~~and regulations~~ promulgated by the Coal Mine Health and Safety Board are available at the project.

9.4. The supervisor or competent person shall make sure that new employees are warned about hazards inherent to the type of work they will perform, and instructed in safety procedures.

9.5. The supervisor or competent person shall make sure that procedures are followed that ~~assure~~ ensure all first aid supplies and equipment are adequately maintained.

9.6. The supervisor or competent person shall make sure that procedures are implemented to keep unauthorized persons off the surface construction project site.

9.7. The employer may designate one (1) or more certified supervisors to perform any of the duties specified in this Section.

9.8. At each construction operation there shall be a bulletin board at some conspicuous place on the construction site, in such a manner that notices, orders, and decisions required by Chapter 22A of the West Virginia Code ~~or Regulation~~ and applicable rules to be posted on the bulletin board may be ~~posed~~ posted thereon, be easily visible to all persons desiring to read them, and be protected against damage by weather and against unauthorized removal.

### **§36-23-10. First Aid Requirements.**

10.1. First aid and medical attention. First aid services and provisions for medical care shall be made available by the employer for every employee covered by ~~these regulations~~ this rule.

10.2. Medical services and first aid.

10.2.1. ~~(a)~~ The employer shall ~~insure~~ ensure the availability of medical personnel for advice and consultation on matters of occupational health.

10.2.2. ~~(b)~~ Provisions shall be made prior to commencement of the project for prompt medical

attention in case of serious injury.

10.2.3. ~~(e)~~ Each surface construction operator shall maintain at each work site a fully equipped first aid station.

10.2.4. The first aid equipment required to be maintained shall include at least the following:

10.2.4.a. ~~(1)~~ One (1) 36 unit first aid kit

10.2.4.b. ~~(2)~~ One (1) broken-backboard

10.2.4.c. ~~(3)~~ One (1) stretcher or basket stretcher ~~basket~~

10.2.4.d. ~~(4)~~ Two (2) cloth blankets

10.2.4.e. Automated external defibrillator (AED) unit. One AED shall be required to be stored on the permitted area in a controlled environment in accordance with the manufacturer's recommendations. All personnel shall be trained on the operation of the AED, and a written record shall be retained.

10.2.5. ~~(d)~~ All first aid supplies required to be maintained under this Section shall be stored in suitable sanitary, dust-tight, moisture-proof containers and such supplies shall be accessible to the construction workers.

10.2.6. ~~(e)~~ No first-aid material shall be removed or diverted without authorization, except in case of an accident in or about the mine.

10.2.7. ~~(f)~~ Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, shall be provided at all times.

10.2.8. ~~(g)~~ The telephone numbers of physicians, hospitals, or ambulances ~~medical service providers~~ and the Mine and Industrial Accident Rapid Response System shall be conspicuously posted.

10.3. First aid training of surface construction employees. Each surface construction operator shall provide every new employee within six (6) months of the date of his/her employment with the opportunity for first-aid training as prescribed by the Director unless such employee has previously received such training. Each employee shall be required to take refresher first-aid training of not less than five (5) hours within each twenty-four (24) months of employment. The employee shall be paid regular wages, or overtime pay if applicable, for all periods of first-aid training.

10.4. Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

10.5. ~~(a)~~ Emergency communications requirements.

10.5.1. Each operator of a construction project shall maintain a communication system for use in an emergency.

10.5.1.a. The emergency communication system required to be maintained in ~~these regulations~~ this rule may be established by telephone or radio transmission or by any other means of prompt approved communications to any facility which has available the means of communications with the person or persons providing emergency medical assistance or transportation.

10.6. ~~(b)~~ Arrangements for emergency medical assistance and transportation for injured persons; posting requirements.

10.6.1. While employees are on duty each operator of a construction project shall have made arrangements with a licensed physician, medical service, medical clinic or hospital to provide medical assistance for any person injured at any construction project.

10.6.2. While employees are on duty each operator shall have made arrangements with an ambulance service, or have otherwise provided for emergency transportation for any person injured at a construction project.

10.6.3. Each operator shall immediately after making arrangements required under the provisions of ~~these rules and regulations~~ this rule, or immediately after any changes of such agreement, post at appropriate places at the construction project the names, titles, ~~and~~ addresses, and telephone numbers of all persons or services ~~correctly~~ currently available under such arrangements to provide medical assistance and transportation at the construction project.

#### **§36-23-11. Sanitation.**

##### **11.1. Potable water.**

11.1.1. ~~(a)~~ An adequate supply of potable water shall be provided ~~in all place of employment~~.

11.1.2. ~~(b)~~ Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Water shall not be dipped from containers.

11.1.3. ~~(c)~~ Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purposes.

11.1.4. ~~(d) The common drinking cup is prohibited.~~ Drinking cups shall not be shared.

11.1.5. (e) Where single service cups (to be used but once) are supplied, both sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

11.1.6. ~~(f)~~ Nonpotable water.

11.1.6.a. ~~(1)~~ Outlets for nonpotable water, such as water for industrial or firefighting purposes only, shall be identified clearly that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.

11.1.7. ~~(g)~~ There shall be no cross connection, open or potential, between a system furnishing potable water and a system furnishing nonpotable water.

11.1.8. ~~(h)~~ "Potable water" means water which meets the quality standards prescribed in the United States Public Health Service Drinking Water Standards, or water which is approved for drinking

purposes by the state or local authority having jurisdiction.

#### 11.2. Sanitary toilet facilities.

11.2.1. ~~(a)~~ At least one (1) sanitary toilet shall be provided where ten (10) or less construction workers use each such toilet facilities.

11.2.2. ~~(b)~~ Where ten (10) or more construction workers use such toilet facilities, sufficient toilets shall be furnished to provide approximately (1) sanitary toilet for each ten (10) construction workers.

11.2.3. ~~(c)~~ Where thirty (30) or more construction workers use toilet facilities, one (1) urinal may be substituted for one (1) ~~flush~~ toilet; however, where such substitutions are made, they shall not reduce the number of toilets below a ratio of two (2) toilets to one (1) urinal.

11.2.4. ~~(d)~~ An adequate supply of toilet paper shall be provided with each toilet.

#### **§36-23-12. Illumination.**

12.1. General. Construction areas, ramps, runways, corridors, offices, shops, and storage areas shall be adequately illuminated.

#### **§36-23-13. Personal Protective and Life Saving Equipment.**

13.1. The employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions or where this ~~part~~ rule indicates the need for using such equipment to reduce the hazards to the employees.

13.2. Design. All personal protective equipment shall be of safe design and construction for the work to be performed.

13.3. Head protection. Employees working in and around surface construction operations shall be protected by protective helmets.

13.4. Safety-toed shoes shall be worn by all persons in and around a surface construction operations.

#### **§36-23-14. Eye and Face Protection.**

14.1. General. Employees shall be provided with eye and face protection equipment when machines or operations present potential eye or face injury from physical, chemical, or radiation agents.

#### **§36-23-15. Respiratory Protection.**

15.1. ~~(a)~~ Respirators shall be provided by the employer when such equipment is necessary to protect the health of an employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employee shall use the provided respiratory protection in accordance with instruction and training received.

15.2. ~~(b) Where practicable, the respirators should~~ Respirators shall be assigned to individual workers for their exclusive use.

**§36-23-16. Safety Belts, Lifelines, and Lanyards.**

16.1. Lifelines, safety belts, and lanyards shall be used only for employee safeguarding. Any lifeline, safety belt, or lanyard actually subjected to in-service loading, as distinguished from static load testing, shall be immediately removed from service and shall not be used again for employee safeguarding.

16.2. Lifelines shall be secured above the point of operation to an anchorage or structural member capable of supporting a minimum dead weight of five thousand four hundred (5,400) pounds. Separate lifelines shall be used to protect each employee.

16.3. Lifelines used on rock-scaling operations, or in areas where the lifeline may be subjected to cutting or abrasion, shall be a minimum of seven-eighths (7/8) inch wire core manila rope. For all other lifeline applications, a minimum of three quarter (3/4) inch manila or equivalent, with a minimum breaking strength of five thousand ~~four hundred (5,400)~~ (5,000) pounds, shall be used.

16.4. Safety belt lanyard shall be a minimum of one-half (1/2) inch nylon, or equivalent, with a maximum length for a fall of no greater than six (6) feet. The rope shall have a nominal breaking strength of five thousand four hundred (5,400) pounds.

16.5. All safety belts and lanyard hardware shall be drop forged or pressed steel, cadmium plated in accordance with Type 1, Class B plating specified in federal specification QQ-P-416. Surface shall be smooth and free of sharp edges.

16.6. All safety belt and lanyard hardware, except rivets, shall be capable of withstanding a tensile loading of four thousand (4,000) pounds without cracking, breaking, or taking a permanent deformation.

~~16.7. Safety protection to prevent an employee from falling shall be provided at all times where the potential fall distance exceeds fifteen (15) feet, and safety belts shall not be used where they are impractical or would pose a safety hazard to the employee.~~

**§36-23-17. Safety Nets.**

17.1. Safety nets shall be provided when work places are more than twenty-five (25) feet above the ground or water surface where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts are impractical.

17.2. Where safety net protection is required by this ~~part~~ Section, operations shall not be undertaken until the net is in place and has been tested.

17.3. ~~(a)~~ Nets shall extend eight (8) feet beyond the edge of the work surface where employees are exposed and shall be installed as close under the work surface as practical but in no case more than twenty-five (25) feet below such work surface. Nets shall be hung with sufficient clearance to prevent users' ~~contract~~ contact with the surfaces or structures below. Such clearances shall be determined by impact load testing.

17.3.1. ~~(b)~~ It is intended that only one (1) level of nets be required for bridge construction.

17.4. The mesh size of nets shall not exceed six (6) inches by six (6) inches. All new nets shall meet accepted performance standards of seventeen thousand five hundred (17,500) foot-pounds minimum impact resistance as determined and certified by the ~~manufactures~~ manufacturer, and shall bear a label of

proof test. Edge ropes shall provide a minimum breaking strength of five thousand (5,000) pounds.

17.5. Forged steel safety hooks or ~~shackles~~ shackles shall be used to fasten the net to its supports.

17.6. Connections between net panels shall develop the full strength of the net.

#### **§36-23-18. Working Over or Near Water.**

18.1. Employees working over or near water, where the danger of drowning exists, shall be provided with United States Coast Guard approved life jackets or buoyant work vests.

18.2. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall not be used.

18.3. Ring buoys with at least ninety (90) feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed two hundred (200) feet.

18.4. At least one (1) lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.

#### **§36-23-19. Definitions Applicable to this Subject.**

19.1. "Lanyard" ~~means~~ shall mean a rope, suitable for supporting one (1) person. One (1) end is fastened to a safety belt or harness and the other end is secured to a substantial object or a safety line.

19.2. "Lifeline" ~~means~~ shall mean a rope, suitable for supporting one (1) person, to which a lanyard or safety belt (or harness) is attached.

19.3. "Personal fall arrest system" shall mean a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

~~19.3:~~ 19.4. "Safety belt" ~~means~~ shall mean a device, usually worn around the waist, which, by reason of its attachment to a lanyard and lifeline or a structure, will prevent a worker from falling.

#### **§36-23-20. Fire Protection.**

20.1. General requirements.

20.1.1. ~~(a)~~ The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction program and demolition work, and ~~he~~ the employer shall provide the firefighting equipment to extinguish the fire hazard that may occur. As fire hazards occur, there shall be no delay in providing the necessary equipment.

20.1.2. ~~(b)~~ Access to all available firefighting equipment shall be maintained at all times.

20.1.3. ~~(c)~~ All firefighting equipment, provided by the employer, shall be conspicuously located.

20.1.4. ~~(d)~~ All firefighting equipment shall be periodically inspected and maintained in operating

condition. Defective equipment shall be immediately replaced.

20.1.5. ~~(e)~~ Fire drills and demonstrations of various types of available firefighting equipment shall be held for employees at least every six (6) months.

### **§36-23-21. Portable Firefighting Equipment.**

#### **21.1. Fire extinguishers and small hose lines.**

21.1.1. ~~(a)~~ A fire extinguisher, rated not less than 2A, shall be provided for each three thousand (3,000) square feet of the protected building area, or major fraction thereof. Travel distance from any point of the protected area to the nearest fire extinguisher shall not exceed one hundred (100) feet.

21.1.2. ~~(b)~~ A one half (1/2) inch diameter garden-type hose line, not to exceed one hundred (100) feet in length and equipped with a nozzle, may be substituted for a 2A-rated fire extinguisher, providing it is capable of discharging a minimum of five (5) gallons per minute with a minimum hose stream range of thirty (30) feet horizontally. The garden-type hose lines shall be mounted on conventional racks or reels. The number and location of hose racks or reels shall be such that at least one (1) hose stream can be applied to all points in the area.

21.1.3. ~~(c)~~ One (1) or more fire extinguishers, rated not less than 2A, shall be provided on each floor. In multi-story buildings, at least one (1) fire extinguisher shall be located adjacent to stairway.

21.1.4. ~~(d)~~ A fire extinguisher, rated not less than 10B, shall be provided within fifty (50) feet of wherever more than five (5) gallons of flammable or combustible liquids or five (5) pounds of flammable gas are being used on the job site. This requirement does not apply to the integral fuel tanks of motor vehicles.














21.1.5. ~~(e)~~ Carbon tetrachloride and other toxic vaporizing liquid fire extinguishers are prohibited.

21.1.6. ~~(f)~~ Portable fire extinguishers shall be inspected at least every six (6) months and maintained in accordance with maintenance and use of portable fire extinguishers NFPA No. 10A-1970.

21.1.7. ~~(g)~~ Fire extinguishers which have been listed or approved by a nationally recognized testing laboratory shall be used to meet the requirements of this ~~subpart~~ Section.

21.1.8. ~~(h)~~ ~~Table 1~~ Table 36-23A shall be used as a guide for selecting the appropriate portable fire extinguishers.

Table 36-23A Fire Extinguishers Data

	WATER TYPE				FOAM	CARBON DIOXIDE	DRY CHEMICAL			
	 STORED PRESSURE	 CARTRIDGE OPERATED	 WATER PUMP TANK	 SODA ACID			SODIUM OR POTASSIUM BICARBONATE		MULTI-PURPOSE ABC	
							 CARTRIDGE OPERATED	 STORED PRESSURE	 STORED PRESSURE	 CARTRIDGE OPERATED
CLASS A FIRES WOOD, PAPER, TRASH HAVING GLOWING EMBERS 	YES	YES	YES	YES	YES	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	YES	YES
CLASS B FIRES FLAMMABLE LIQUIDS, GASOLINE, OIL, PAINTS, GREASE, ETC. 	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
CLASS C FIRES ELECTRICAL EQUIPMENT 	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
CLASS D FIRES COMBUSTIBLE METALS 	SPECIAL EXTINGUISHING AGENTS APPROVED BY RECOGNIZED TESTING									
METHOD OF OPERATION	PULL PIN, SQUEEZE HANDLE	TURN UPSIDE DOWN AND BUMP	PUMP HANDLE	TURN UPSIDE DOWN	TURN UPSIDE DOWN	PULL PIN, SQUEEZE LEVER	RUPTURE CARTRIDGE SQUEEZE LEVER	PULL PIN, SQUEEZE HANDLE	PULL PIN, SQUEEZE HANDLE	RUPTURE CARTRIDGE SQUEEZE LEVER
RANGE	10' - 40'	10' - 40'	10' - 40'	10' - 40'	10' - 40'	3' - 8'	5' - 10'	5' - 10'	5' - 10'	5' - 10'
MAINTENANCE	CHECK AIR PRESSURE GAUGE MONTHLY	WEIGH GAS CARTRIDGE AND ADD WATER IF REQUIRED ANNUALLY	DISCHARGE AND FILL WITH WATER ANNUALLY	DISCHARGE ANNUALLY - RECHARGE	DISCHARGE ANNUALLY - RECHARGE	WEIGH SEMI-ANNUALLY	WEIGH GAS CARTRIDGE - CHECK CONDITION OF DRY CHEMICAL ANNUALLY	CHECK GAS PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	CHECK GAS PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	WEIGH GAS CARTRIDGE - CHECK CONDITION OF DRY CHEMICAL ANNUALLY

## 21.2. Fire hose and connections.

21.2.1. ~~(a)~~ One hundred (100) feet, or less, of one and one-half (1-1/2) inch hose, with a nozzle capable of discharging water at twenty-five (25) gallons per minute, may be substituted for a fire extinguisher rated not more than 2A in the designated area provided that the hose line can reach all points in the area.

21.2.2. ~~(b)~~ If fire hose connections are not compatible with local firefighting equipment, the contractor shall provide adapters, or equivalent, to permit connections.

21.2.3. ~~(c)~~ During demolition involving combustible materials, charged hose lines, supplied by hydrants, water tank trucks with pumps, or equivalent, shall be made available.

**§36-23-22. Fire Prevention.**

## 22.1. Ignition hazards.

22.1.1. ~~(a)~~ Electrical wiring and equipment for light, heat, or power purposes shall be installed in compliance with the National Electric Code, NFPA 70-1971; ANSI CI-1971 (Rev. of 1968).

22.1.2. ~~(b)~~ Internal combustion engine powered equipment shall be so located that the exhausts are well away from combustible materials. When the exhausts are piped to outside the building under construction, a clearance of at least six (6) inches shall be maintained between such piping and combustible material.

22.1.3. ~~(c)~~ Smoking shall be prohibited at or in the vicinity of operations which constitute a fire hazard, and shall be conspicuously posted: "No Smoking" or "Open Flame".

22.1.4. ~~(d)~~ The nozzle of air, inert gas, and steam lines or hoses, when used in the cleaning or ventilation of tanks and vessels that contain hazardous concentrations of flammable gases or vapors, shall be bonded to the tank or vessel shell. Bonding devices shall not be attached or detached in hazardous concentrations of flammable gases or vapors.

## 22.2. Temporary buildings.

22.2.1. ~~(a)~~ No temporary building shall be erected where it will adversely affect any means of exit.

22.2.2. ~~(b)~~ Temporary buildings, when located within another building or structure, shall be of either noncombustible construction or of combustible construction having a fire resistance of not less than one (1) hour.

22.2.3. ~~(c)~~ Temporary buildings, located other than inside another building and not used for the storage, handling, or use of flammable or combustible liquids, flammable gases, explosives, or blasting agents, or similar hazardous occupancies, shall be located at a distance of not less than ten (10) feet from another building or structure. Groups of temporary buildings, not exceeding two thousand (2,000) square feet in aggregate, shall, for the purposes of this ~~part~~ Section, be considered a single temporary building.

## 22.3. Open yard storage.

22.3.1. ~~(a)~~ Combustible materials shall be piled with due regard to the stability of piles and in no case higher than twenty (20) feet.

22.3.2. ~~(b)~~ Driveways between and around combustible storage piles shall be free from accumulation of rubbish or other articles or materials.

22.3.3. ~~(c)~~ The entire storage site shall be kept free from accumulation of unnecessary combustible materials. Weeds and grass shall be kept down and a regular procedure provided for the periodic clean-up of the entire area.

22.3.4. ~~(d)~~ When there is a danger of an underground fire, that land shall not be used for combustible or flammable storage.

22.3.5. ~~(e)~~ Method of piling shall be solid wherever possible and in orderly and regular piles. No combustible material shall be permanently stored outdoors within ten (10) feet of a building or structure.

22.3.6. ~~(f)~~ Portable fire extinguishing equipment, suitable for the fire hazard involved, shall be provided at convenient, conspicuously accessible locations in the yard area. Portable fire extinguishers,

rated not less than 2A, shall be placed so that maximum travel distance to the nearest unit shall not exceed one hundred (100) feet.

#### 22.4. Indoor storage.

22.4.1. ~~(a)~~ Storage shall not obstruct, or adversely affect, means of exit.

22.4.2. ~~(b)~~ All materials shall be stored, handled, and piled with due regard to their fire characteristics.

22.4.3. ~~(c)~~ Aisle space shall be maintained to safely accommodate the widest vehicle that may be used within the building for firefighting purposes.

22.4.4. ~~(d)~~ Clearance shall be maintained around lights and heating units to prevent ignition of combustible materials.

22.4.5. ~~(e)~~ A clearance of twenty-four (24) inches shall be maintained around the path of travel of fire doors unless a barricade is provided, in which case no clearance is needed. Material shall not be stored within thirty-six (36) inches of a fire door opening.

22.4.6. ~~(f)~~ When burning, cutting, or welding is performed in an area that may contain methane, an examination shall be conducted prior to, during, and after such burning, cutting, or welding by a qualified person. A record of such examination(s) shall be kept for one (1) year and made available for inspection to interested persons.

### **§36-23-23. Flammable and Combustible Liquids.**

#### 23.1. General requirements.

23.1.1. ~~(a)~~ Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one (1) gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one (1) gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

23.1.2. ~~(b)~~ Flammable or combustible liquids shall not be stored in areas used for exits, stairways, or normally used for the safe passage of people.

#### 23.2. Indoor storage of flammable and combustible liquids.

23.2.1. ~~(a)~~ No more than twenty-five (25) gallons of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.

23.2.2. ~~(b)~~ Quantities of flammable and combustible liquids in excess of twenty-five (25) gallons shall be stored in an acceptable or approved cabinet meeting the following requirements:

23.2.2.a. ~~(1)~~ Acceptable wooden storage cabinets shall be constructed in the following manner, or equivalent: The bottom, sides, and top shall be constructed of an exterior grade of plywood at least one (1) inch in thickness, which shall not break down or delaminate under standard fire test conditions.

23.2.2.b. All joints shall be rabbeted and shall be fastened in two (2) directions with flathead wood screws. When more than one (1) door is used, there shall be a rabbeted overlap of not less than one (1) inch. Steel hinges shall be mounted in such a manner as to not lose their holding capacity due to loosening or burning out of the screws when subjected to fire. Such cabinets shall be painted inside and out with fire retardant paint.

23.2.2.c. ~~(2)~~ Approved metal storage cabinets will be acceptable.

23.2.2.d. ~~(3)~~ Cabinets shall be labeled in conspicuous lettering: "Flammable--Keep Fire Away".

23.2.3. ~~(e)~~ Not more than sixty (60) gallons of flammable or one hundred twenty (120) gallons of combustible liquids shall be stored in any one (1) storage cabinet. Not more than three (3) such cabinets may be located in a single storage area. Quantities in excess of this shall be stored in an inside storage room.

23.2.4. ~~(d)~~ ~~(1)~~ Inside storage rooms shall be constructed to meet the required fire-resistive rating for their use. Such construction shall comply with the test specifications set forth in Standard Methods of Fire Test of Building Construction and Material, NFPA 251-1969.

23.2.5. ~~(2)~~ Where an automatic extinguishing system is provided, the system shall be designed and installed in an approved manner. Openings to other rooms or buildings shall be provided with noncombustible liquid tight raised sills or ramps at least four (4) inches in height, or the floor in the storage area shall be at least four (4) inches below the surrounding floor. Openings shall be provided with approved self-closing fire doors. The room shall be liquid tight where the walls join the floor. A permissible alternate to the sill or ramp is an open-grated trench, inside of the room, which drains to a safe location. Where other portions of the building or other buildings are exposed, windows shall be protected as set forth in the Standard for Fire Door and Windows, NFPA No. 80-1970, for Class E or F openings. Wood of at least one (1) inch nominal thickness may be used for shelving, racks, dunnage, scuffboards, floor overlay, and similar installations.

23.2.6. ~~(3)~~ Materials which will react with water and create a fire hazard shall not be stored in the same room with flammable or combustible liquids.

23.2.7. Storage in inside storage rooms shall comply with ~~Table 2~~ Table 36-23B at the end of this Subsection.

23.2.7.a. ~~(4)~~ Electrical wiring and equipment located in inside storage rooms shall be approved for Class 1, Division 2, Hazardous locations. For definitions of Class 1, Division 1 Hazardous locations, see ~~31.5~~ Section 32.7.

23.2.7.b. ~~(5)~~ Every inside storage room shall be provided with either a gravity or a mechanical exhausting system. Such system shall commence not more than twelve (12) inches above the floor and be designed to provide for a complete change of air within the room at least six (6) times per hour. If a mechanical exhausting system is used, it shall be controlled by a switch located outside of the door. The ventilating equipment and lighting fixtures shall be operated by the same switch. An electric pilot light shall be installed adjacent to the switch if flammable liquids are dispensed within the room. Where gravity ventilation is provided, the fresh air intake, as well as the exhausting outlet from the room, shall be on the exterior of the building in which the room is located.

23.2.7.c. ~~(6)~~ In every inside storage room there shall be maintained one (1) clear aisle at least three (3) feet wide. Containers over thirty (30) gallons capacity shall not be stacked one (1) upon the other.

23.2.7.d. ~~(7)~~ Flammable and combustible liquids in excess of that permitted in inside storage rooms shall be stored outside of buildings in accordance with ~~paragraph 23.3. of this section~~ Section 23.3.

Table 36-23B

<u>Fire protection provided</u>	<u>Fire resistance</u>	<u>Maximum size</u>	<u>Total allowable quantities</u> <u>gals./sq. ft./floor area</u>
<u>Yes</u>	<u>2 hrs</u>	<u>500 sq. ft.</u>	<u>10</u>
<u>No</u>	<u>2 hrs</u>	<u>500 sq. ft.</u>	<u>4</u>
<u>Yes</u>	<u>1 hr</u>	<u>150 sq. ft.</u>	<u>5</u>
<u>No</u>	<u>1 hr</u>	<u>150 sq. ft.</u>	<u>2</u>

NOTE: Fire protection system shall be sprinkler, water spray, carbon dioxide or other system approved by a nationally recognized testing laboratory for this purpose.

### 23.3. Storage outside buildings.

23.3.1. ~~(a)~~ Storage of containers (not more than sixty (60) gallons each) shall not exceed one thousand one hundred (1,100) gallons in any one (1) pile or area. Piles or groups of containers shall be separated by a five (5) foot clearance. Piles or groups of containers shall not be nearer than twenty (20) feet to a building.

23.3.2. ~~(b)~~ Within two hundred (200) feet of each pile of containers, there shall be a twelve (12) foot wide access way to permit approach of fire control apparatus.

23.3.3. ~~(c)~~ The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures, or shall be surrounded by a curb or earth dike at least twelve (12) inches high. When curbs or dikes are used, provisions shall be made for draining off accumulations of ground or rain water, or spills of flammable or combustible liquids. Drains shall terminate at a safe location and shall be accessible to operation under fire conditions.

### 23.3.4. ~~(d)~~ Outdoor portable tank storage.

23.3.4.a. ~~(1)~~ Portable tanks shall not be nearer than twenty (20) feet from any building. Two (2) or more portable tanks, grouped together, having a combined capacity in excess of two thousand two hundred (2,200) gallons, shall be separated by a five (5) foot clear area. Individual portable tanks exceeding one thousand one hundred (1,100) gallons shall be separated by a five (5) foot clear area.

23.3.4.b. ~~(2)~~ Within two hundred (200) feet of each portable tank, there shall be a twelve (12) foot wide access way to permit approach of fire control apparatus.

23.3.5. ~~(e)~~ Storage areas shall be kept free of weeds, debris, and other combustible material not necessary to the storage.

23.3.6. ~~(f)~~ Portable tanks, not exceeding six hundred sixty (660) gallons, shall be provided with emergency venting and other devices, as required by Chapters 3 and 4 of the Flammable and Combustible Liquids Code, NFPA 30-1969, the Flammable and Combustible Liquids Code.

23.3.7. ~~(g)~~ Portable tanks, in excess of six hundred sixty (660) gallons, shall have emergency ventilating and other devices as required by Chapters 2 and 3 of the Flammable and Combustible Liquids Code, NFPA Code 30-1969.

23.4. Fire control for flammable or combustible liquid storage.

23.4.1. ~~(a)~~ At least one (1) portable fire extinguisher having a rating of not less than UL rated 20B units shall be located outside of, but not more than ten (10) feet, from the door opening into any room used for storage of more than sixty (60) gallons of flammable or combustible liquids.

23.4.2. ~~(b)~~ At least one (1) portable fire extinguisher having a rating of not less than UL rated 20B units shall be located not less than twenty-five (25) feet, nor more than seventy-five (75) feet, from any flammable liquid storage area located outside.

23.4.3. ~~(c)~~ At least one (1) portable fire extinguisher having a rating of not less than UL rated 20B:C units shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids.

23.5. Dispensing liquids.

23.5.1. ~~(a)~~ Areas in which flammable or combustible liquids are transferred at one (1) time, in quantities greater than five (5) gallons from one (1) tank or container to another tank or container, shall be separated from other operations by twenty-five (25) feet distance or by construction having a fire resistance of at least one (1) hour. Drainage or other means shall be provided to control spills. Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below ten (10) percent of the lower flammable limit.

23.5.2. ~~(b)~~ Transfer of flammable liquids from one (1) container to another shall be done only when containers are electrically interconnected (bonded).

23.5.3. ~~(c)~~ Flammable or combustible liquids shall be drawn from or transferred into vessels, containers, or tanks within a building or outside only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container or portable tanks, by gravity or pump, through an approved self-closing valve. Transferring by means of air pressure of the container or portable tanks is prohibited.

23.5.4. ~~(d)~~ The dispensing units shall be protected against collision damage.

23.5.5. ~~(e)~~ Dispensing devices and nozzles for flammable liquids shall be of an approved type.

23.6. Handling liquids at point of final use.

23.6.1. ~~(a)~~ Flammable liquids shall be kept in closed containers when not actually in use.

23.6.2. ~~(b)~~ Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.

23.6.3. ~~(c)~~ Flammable liquids may be used only where there are no open flames or other sources of ignition within fifty (50) feet of the operation, unless conditions warrant greater clearance.

## 23.7. Service and refueling areas.

23.7.1. ~~(a)~~ Flammable or combustible liquids shall be stored in approved closed containers, in tanks located underground, or in above-ground portable tanks.

23.7.2. ~~(b)~~ The tank trucks shall comply with the requirements covered in the standard for tank vehicles for flammable and combustible liquids, NFPA No. 385-1966.

23.7.3. ~~(c)~~ The dispensing hose shall be an approved type.

23.7.4. ~~(d)~~ The dispensing nozzle shall be an approved automatic-closing type without a latch-open device.

23.7.5. ~~(e)~~ Underground tanks shall not be abandoned.

23.7.6. ~~(f)~~ Clearly identified and easily accessible switch(es) shall be provided at a location remote from dispensing devices to shut off the power to all dispensing devices in the event of an emergency.

23.7.7. ~~(g)~~ Heating equipment.

23.7.7.a. ~~(1)~~ Heating equipment of an approved type may be installed in the lubrication or service area where there is no dispensing or transferring of flammable liquids, provided the bottom of the heating unit is at least eighteen (18) inches above the floor and is protected from physical damage.

23.7.7.b. ~~(2)~~ Heating equipment installed in lubrication or service areas, where flammable liquids are dispensed, shall be of an approved type for garages, and shall be installed at least eight (8) feet above the floor.

27.7.8. ~~(h)~~ There shall be no smoking or open flames in the areas used for fueling, servicing fuel systems for internal combustion engines, or receiving or dispensing of flammable or combustible liquids.

27.7.9. ~~(i)~~ Conspicuous and legible signs prohibiting smoking shall be posted.

27.7.10. ~~(j)~~ The motors of all equipment being fueled shall be shut off during the fueling operation.

27.7.11. ~~(k)~~ Each service or fueling area shall be provided with at least one (1) fire extinguisher having a UL rating of not less than 20B:C located so that an extinguisher ~~will~~ shall be within seventy-five (75) feet of each pump, dispenser, underground fill pipe opening, and lubrication or service area.

### §36-23-24. Temporary Heating Devices.

#### 24.1. ~~(a)~~ Ventilation.

24.1.1. ~~(1)~~ Fresh air shall be supplied in sufficient quantities to maintain the health and safety of ~~workmen~~ workers. Where natural means of fresh air supply is inadequate, mechanical ventilation shall be provided.

24.1.2. ~~(2)~~ When heaters are used in confined spaces, special care shall be taken to provide sufficient ventilation in order to ensure proper combustion, maintain the health and safety of ~~workmen~~ workers, and limit temperature rise in the area.

24.2. ~~(b)~~ Clearance and mounting.

24.2.1. ~~(1)~~ Temporary heating devices shall be installed to provide clearance to combustible material not less than the amount shown in ~~Table 3~~ Table 36-23C.

Table 36-23C

<u>Heating appliances</u>	<u>Minimum clearance (inches)</u>		
	<u>Sides</u>	<u>Rear</u>	<u>Chimney Connector</u>
<u>Room heater, circulating type</u>	<u>12</u>	<u>12</u>	<u>18</u>
<u>Room heater, radiant type</u>	<u>36</u>	<u>36</u>	<u>18</u>

~~(2) Temporary heating devices, which are listed for installation with lesser clearances than specified in Table 3 may be installed in accordance with their approval.~~

24.2.2. ~~(3)~~ Heaters not suitable for use on wood floors shall not be set directly upon them or other combustible materials. When such heaters are used, they shall rest on suitable heat insulating material or at least one (1) inch concrete, or equivalent. The insulating material shall extend beyond the heater two (2) feet or more in all directions.

24.2.3. ~~(4)~~ Heaters used in the vicinity of combustible tarpaulins, canvas, or similar coverings shall be located at least ten (10) feet from the coverings.

24.2.3.a. The coverings shall be securely fastened to prevent ignition or upsetting of the heater due to wind action on the covering or other material.

24.3. ~~(c)~~ Stability.

24.3.1. Heaters, when in use, shall be set horizontally level, unless otherwise permitted by the manufacturers markings.

24.4. ~~(d)~~ Solid fuel salamanders.

24.4.1. Solid fuel salamanders are prohibited in buildings and on scaffolds.

24.5. ~~(e)~~ Oil-fired heaters.

24.5.1. ~~(1)~~ Flammable liquid-fired heaters shall be equipped with a primary safety control to stop the flow of fuel in the event of flame failure. Barometric or gravity oil feed shall not be considered a primary safety control.

24.5.2. ~~(2)~~ Heaters designed for barometric or gravity oil feed shall be used only with the integral tanks.

24.5.3. ~~(3)~~ Heaters specifically designed and approved for use with separate supply tanks may be

directly connected for gravity feed, or an automatic pump, from a supply tank.

24.6. 24.2. Definitions applicable to ~~subpart~~ Sections §§36-23-20 through 36-23-24.

24.6.1. ~~(a)~~ “Approved” for the purpose of ~~this subpart these Sections~~ means shall mean equipment that has been listed or approved by a nationally recognized testing laboratory such as Factory Mutual Engineering Corporation, or Underwriters Laboratories Incorporated, or federal agencies such as the Bureau of Mines or the United States Coast Guard, which issues approvals for such equipment.

24.6.2. ~~(b)~~ “Closed container” means shall mean a container so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures.

24.6.3. “Combustible liquids” means shall mean any liquid having a flash point at or above one hundred forty (140) degrees (140 degrees) F. ~~(sixty (60) degrees C.)~~, and below two hundred (200) degrees F. ~~(ninety three point four (93.4) degrees C.)~~.

24.6.4. ~~(d)~~ “Combustion” means shall mean any chemical process that involves oxidation sufficient to produce light or heat.

24.6.5. ~~(e)~~ “Fire resistance” means shall mean so resistant to fire that, for a specified time and under conditions of a standard heat intensity, it will not ~~fail fail~~ structurally and will not permit the side away from the fire to become hotter than a specified temperature. For purposes of ~~this part these Sections~~, fire resistance shall be determined by the standard Methods of Fire Tests of Building Construction and Materials, NFPA 251-1969.

24.6.6. ~~(f)~~ “Flammable” means shall mean capable of being easily ignited, burning intensely, or having a rapid rate of flame spread.

24.6.7. ~~(g)~~ “Flammable liquids” means shall mean any liquid having a flash point below one hundred forty (140) degrees F. and having a vapor pressure not exceeding forty (40) pounds per square inch (absolute) at one hundred (100) degrees F.

24.6.8. ~~(h)~~ “Flash point” of the liquid means shall mean the temperature at which it gives off vapor sufficient to form an ignitable mixture with the air near the surface of the liquid or within the vessel used as determined by appropriate test procedure and apparatus as specified below.

24.6.8.a. ~~(1)~~ The flash point of liquids having a viscosity less than forty-five (45) Saybolt Universal Seconds at one hundred (100) degrees F. ~~(thirty seven point eight (37.8) degrees C.)~~ and a flash point below one hundred seventy-five (175) degrees F. ~~(seventy nine point four (79.4) degrees C.)~~ shall be determined in accordance with the standard method of Test for Flash Point by the ~~Tag Tag~~ Closed Tester, ASTM D-56-69.

24.6.8.b. ~~(2)~~ The flash point of liquids having a viscosity of forty-five (45) Saybolt Universal Second(s) Seconds or more than one hundred seventy-five (175) degrees F. ~~(seventy nine point four (79.4) degrees C.)~~ or higher shall be determined in accordance with the standard method of test for Flash Point by the Pensky Martens Closed Tester, ASTM D-93-69.

24.6.9. ~~(i)~~ “Portable tank” means shall mean a closed container having a liquid capacity more than sixty (60) United States gallons, and not intended for fixed installation.

24.6.10. ~~(j)~~ "Safety can" ~~means~~ shall mean an approved metal container, of not more than five (5) gallons capacity, having a flash-arresting screen, spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

24.6.11. ~~(k)~~ "Vapor pressure" ~~means~~ shall mean the pressure, measured in pounds per square inch (absolute), exerted by a volatile liquid, as determined by the standard method of test for Vapor Pressure of Petroleum Products (Reid Method), (ASTM D-323-58.)

### **§36-23-25. Accident Prevention Signs and Tags.**

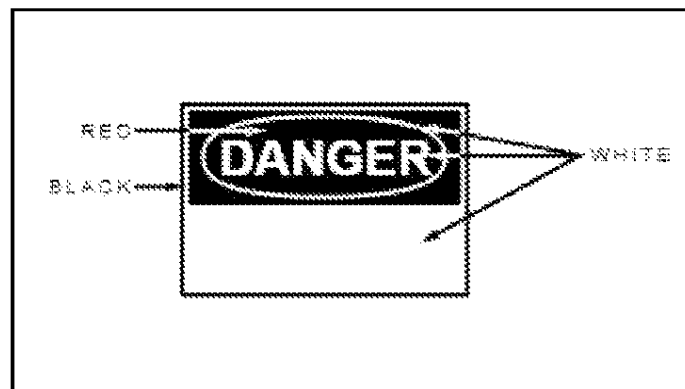
25.1. General. Signs and symbols required by this ~~subpart~~ Section shall be visible at all times when work is being performed, and shall be removed or covered promptly when the hazards no longer exist.

25.2. Danger signs.

25.2.1. ~~(a)~~ Danger signs (see Table ~~4~~ 36-23D) shall be used only where an immediate hazard exists.

25.2.2. ~~(b)~~ Danger signs shall have ~~red~~ red as the ~~predominating~~ predominant color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording.

Table 36-23D

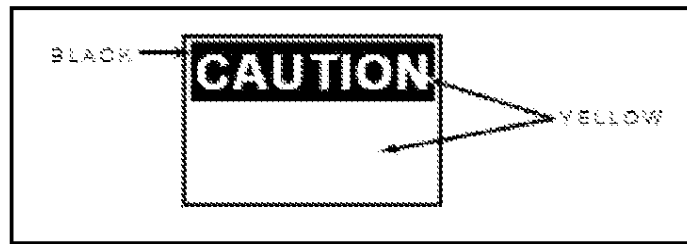


25.3. Caution signs.

25.3.1. ~~(a)~~ Caution signs (See Table ~~5~~ 36-23E) shall be used only to warn against potential hazards or to caution against unsafe practices.

25.3.2. ~~(b)~~ Caution signs shall have yellow as the ~~predominating~~ predominant color; black upper panel and borders; yellow lettering of "CAUTION" on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording.

Table 36-23E



#### 25.4. Exit signs.

25.4.1. Exit signs, when required, shall be lettered in legible red letters, not less than six (6) inches high, on a white field and the principal stroke of the letters shall be at least three-fourths (3/4) inch in width.

#### 25.5. Safety instruction signs.

25.5.1. Safety instruction signs, when used, shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the signs shall be black letters on the white background.

#### 25.6. Directional signs.

25.6.1. Directional signs, other than automotive traffic signs specified in ~~paragraph~~ Section 25.7. ~~of this section~~, shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be black letters on the white background.

#### 25.7. Traffic signs.

25.7.1. ~~(1)~~ Construction areas shall be posted with legible traffic signs at points of hazard.

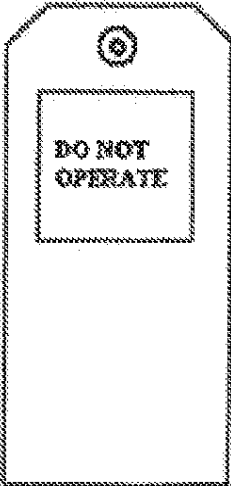
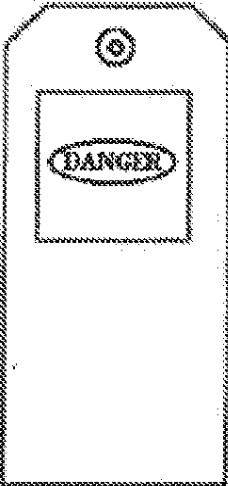
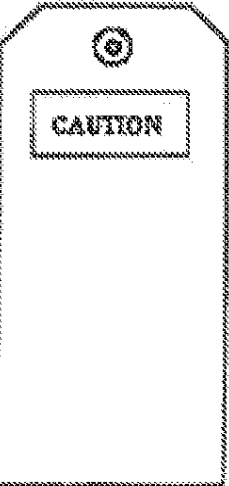
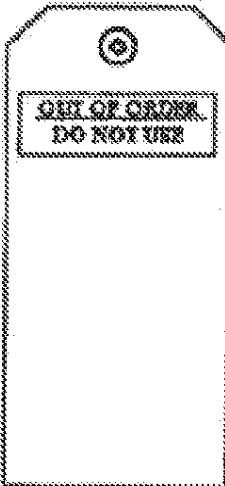
25.7.2. ~~(2)~~ All traffic control signs or devices used for protection of construction ~~workmen~~ workers shall conform to American National Standards Institute, D6.1-1971, Manual on Uniform Traffic Control Devices for Streets and Highways.

#### 25.8. Accident prevention tags.

25.8.1. ~~(a)~~ Accident prevention tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs.

25.8.2. ~~(b)~~ Specifications for accident prevention tags similar to those in Table ~~6~~ 36-23E shall apply.

Table 36-23F

			
White tag - White letters on a red square	White tag - White letters on red oval with a black square	Yellow tag - Yellow letters on a black background	White tag - White letters on a black background
Basic Block (Background)	Safety Colors (Ink)	Copy Specification (Letters)	
White	Red	Do Not Operate	
White	Black and Red	Danger	
Yellow	Black	Caution	
White	Black	Out of Order Do Not Use	

25.8.3. (c) Additional Rules American National Standards Institute (ANSI) Z35.1-1968, Specifications for Accident Prevention Tags, contain rules which are additional to the rules prescribed in this Section. The employer shall comply with ANSI Z35.1-1968 and Z35.2-1968 with respect to rules not specifically prescribed in this ~~subpart~~ Subsection.

25.8.4. (d) Machinery, equipment (~~including machine equipment~~), tools and any other device found to be creating an imminent hazard shall be removed from service and properly tagged. Such ~~machine~~ machinery, equipment, tool or other device shall not be operated and the tag shall not be removed until the defective condition is corrected.

#### §36-23-26. Signaling.

##### 26.1. Flagmen.

(a)

26.1.1. (1) When operations are such that signs, signals, and barricades do not provide the

necessary protection on or adjacent to a highway or street, flagmen or other appropriate traffic controls shall be provided.

26.1.2. ~~(2)~~ Signaling directions by flagmen shall conform to American National Standards Institute D6.1-1971, Manual on Uniform Traffic Control Devices for Streets and Highways.

26.1.3. ~~(b)~~ Hand signaling by flagmen shall be by use of red flags at least thirteen (13) inches square or sign paddles, and in periods of darkness, red lights.

26.1.4. ~~(c)~~ Flagmen shall be provided with and shall wear a red or orange warning garment while flagging. Warning garments worn at night shall be of ~~reflectorized~~ reflective material.

26.2. Barricades. Barricades for protection of employees shall conform to ~~the portions of these regulations~~ §36.23.25. of this rule.

26.3. Definitions applicable to ~~this~~ Sections 36-23-25 and 36-23-26:

26.3.1. ~~(a)~~ "Barricade" ~~means~~ shall mean an obstruction to deter the passage of persons or vehicles.

26.3.2. ~~(b)~~ "Signs" are the warnings of hazard, temporarily or permanently affixed or placed, at locations where hazards exist.

26.3.3. ~~(c)~~ "Tags" are temporary signs, usually attached to a piece of equipment or part of a structure, to warn of existing or immediate hazards.

### **§36-23-27. General Requirements for Storage.**

#### 27.1. General.

27.1.1. ~~(a)~~ All materials stored in tiers shall be stacked, racked, blocked, interlocked or otherwise secured to prevent sliding, falling or collapse.

27.1.2. ~~(b)~~ Maximum safe load limits of floors within buildings and structures, in pounds per square foot, shall be conspicuously posted in all storage areas, except for the floor or slab on grade. Maximum safe loads shall not be exceeded.

27.1.3. ~~(c)~~ Aisles and passageways shall be kept clear to provide for the free and safe movement of material handling equipment or employees. Such areas shall be kept in good repair.

27.1.4. ~~(d)~~ When a difference in road or working levels exists, means such as ramps, blocking, or grading shall be used to ensure the safe movement of vehicles between the two (2) levels.

#### 27.2. Material storage.

27.2.1. ~~(a)~~ Material stored inside buildings under construction shall not be placed within six (6) feet of any hoistway or inside floor openings, ~~not~~ nor within ten (10) feet of an exterior wall which does not extend above the top of the material stored.

27.2.2. ~~(b)~~ Employees required to work on stored material in silos, hoppers, tanks, and similar

storage areas shall be equipped with lifelines and safety belts meeting the requirements of ~~Sections 13-19 of these regulations~~ §36-23-16 of this rule.

27.2.3. ~~(c)~~ Noncompatible materials shall be segregated in storage.

27.2.4. ~~(d)~~ Bagged materials shall be stacked by stepping back the layers and cross-keying the bags at least every ten (10) bags high.

27.2.5. ~~(e)~~ Materials shall not be stored on scaffolds or runways in excess of supplies needed for immediate operations.

27.2.6. ~~(f)~~ Brick stacks shall not be more than seven (7) feet in height. When a loose brick stack reaches a height of four (4) feet, it shall be tapered back two (2) inches ~~in~~ for every foot of height above the four (4) foot level.

27.2.7. ~~(g)~~ When masonry blocks are stacked higher than six (6) feet, the stack shall be tapered back one-half (1/2) block per tier above the six (6) foot level.

27.2.8. ~~(h)~~ Lumber:

27.2.8.a. ~~(1)~~ Used lumber shall have all nails withdrawn before stacking.

27.2.8.b. ~~(2)~~ Lumber shall be stacked on level and solidly supported sills.

27.2.8.c. ~~(3)~~ Lumber shall be so stacked as to be stable and self-supporting.

27.2.8.d. ~~(4)~~ Lumber piles shall not exceed twenty (20) feet in height provided that lumber to be handled manually shall not be stacked more than sixteen (16) feet high.

27.2.9. ~~(i)~~ Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, shall be stacked and blocked so as to prevent spreading or tilting.

27.2.10. ~~(j)~~ Handling materials, general: Housekeeping. Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

### **§36-23-28. Rigging Equipment for Material Handling.**

#### **28.1. General.**

28.1.1. ~~(a)~~ Rigging equipment for material handling shall be inspected by a competent person prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.

28.1.2. ~~(b)~~ Employers must ensure that rigging equipment: ~~Rigging equipment shall not be loaded in excess of its recommended safe working load, as prescribed in Tables 7 through 26 in Section 29 of these regulations.~~

28.1.2.a. Has permanently affixed and legible identification markings as prescribed by the manufacturer that indicate the recommended safe working load;

28.1.2.b. Not be loaded in excess of its recommended safe working load as prescribed on the identification markings by the manufacturer; and

28.1.2.c. Not be used without affixed, legible identification markings, required by Subdivision 28.1.2.a. of this Subsection.

28.1.3. (c) Rigging equipment, when not in use, shall be removed from the immediate work area so as not to present a hazard to employees.

28.1.4. (d) Special custom design grabs, hooks, clamps, or other lifting accessories, for such units as modular panels, prefabricated structures and similar materials, shall be marked to indicate the safe working loads and shall be proof-tested prior to use to one hundred twenty-five percent (125%) of their rated load.

28.1.5. (e) ~~Special containers shall be used to hoist small materials such as, bolts, rivets, tools, etc. and such containers shall be capable of safely supporting intended loads, such container shall not be over-filled to allow spillage while being hoisted.~~ Inspections. Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the employer. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service.

28.1.6. This Section (36-23-28) applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting, in employments covered by this rule. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene).

## 28.2. Alloy steel chains.

28.2.1. (a) Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.

28.2.2. (b) Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.

28.2.3. (c) Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments shall not be used.

28.2.4. (d) ~~Rated capacity (working load limit) for alloy steel chain slings shall conform to the values shown in Table 7.~~ Employers shall not use alloy steel-chain slings with loads in excess of the rated capacities (i.e., working load limits) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.

28.2.5. (e) ~~Whenever wear at any point of any chain link exceeds that shown in Table 8, the assembly shall be removed from service.~~ Whenever wear at any point of any chain link exceeds that shown in Table 36-23G following this Subsection, the assembly shall be removed from service.

Table 36-23G -- Maximum Allowable Wear at any Point of Link

<u>Chain size (inches)</u>	<u>Maximum allowable wear (inch)</u>
<u>1/4</u>	<u>3/64</u>
<u>3/8</u>	<u>5/64</u>
<u>1/2</u>	<u>7/64</u>
<u>5/8</u>	<u>9/64</u>
<u>3/4</u>	<u>5/32</u>
<u>7/8</u>	<u>11/64</u>
<u>1</u>	<u>3/16</u>
<u>1-1/8</u>	<u>7/32</u>
<u>1-1/4</u>	<u>1/4</u>
<u>1-3/8</u>	<u>9/32</u>
<u>1-1/2</u>	<u>5/16</u>
<u>1-3/4</u>	<u>11/32</u>

28.2.6. Inspections.

28.2.6.a. In addition to the inspection required by other subsections of this rule, a thorough periodic inspection of alloy steel chain slings in use shall be made on a regular basis, to be determined on the basis of (A) frequency of sling use; (B) severity of service conditions; (C) nature of lifts being made; and (D) experience gained on the service life of slings used in similar circumstances. Such inspections shall in no event be at intervals greater than once every twelve (12) months.

28.2.6.b. The employer shall make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and shall make such record available for examination.

## 28.3. Wire rope.

28.3.1. Employers must not use improved plow-steel wire rope and wire-rope slings with loads in excess of the rated capacities (i.e., working load limits) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer. (a) Tables 9 through 20 shall be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope slings with various types of terminals. For sizes, classifications, and grades not included in these tables, the safe working load recommended by the manufacturer for specific, identifiable products shall be followed, provided that a safety factor of not less than five (5) is maintained.

28.3.2. (b) Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

28.3.3. ~~(c)~~ Wire rope shall not be secured by knots, except on haul back lines on scrapers.

28.3.4. ~~(d)~~ The following limitations shall apply to the use of wire ropes:

28.3.4.a. ~~(1)~~ An eye splice made in any wire rope shall ~~have~~ not ~~have~~ less than three (3) full tucks. However, this requirement shall not operate to preclude the use of another form of splice or connection which can be shown to be as efficient and which is not otherwise prohibited.

28.3.4.b. ~~(2)~~ Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, shall consist of one (1) continuous piece without knot or splice.

28.3.4.c. ~~(3)~~ Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire rope clips or knots.

28.3.4.d. ~~(4)~~ Wire rope shall not be used if, in any length of eight (8) diameters, the total number of visible broken wires exceeds ten (10) percent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion, or defect.

28.3.5. ~~(e)~~ When U-bolt wire rope clips are used to form eyes, ~~Table 26~~ Table 36-23H shall be used to determine the number and packing of clips.

Table 36-23H -- Number and Spacing of U-Bolt Wire Rope Clips

<u>Improved plow steel, rope, diameter (inches)</u>	<u>Number of clips</u>		<u>Minimum spacing inches</u>
	<u>Drop forged</u>	<u>Other material</u>	
<u>1/2</u>	<u>3</u>	<u>4</u>	<u>3</u>
<u>5/8</u>	<u>3</u>	<u>4</u>	<u>3-3/4</u>
<u>3/4</u>	<u>4</u>	<u>5</u>	<u>4-1/2</u>
<u>7/8</u>	<u>4</u>	<u>5</u>	<u>5-1/4</u>
<u>1</u>	<u>5</u>	<u>6</u>	<u>6</u>
<u>1-1/8</u>	<u>6</u>	<u>6</u>	<u>6-3/4</u>
<u>1-1/4</u>	<u>6</u>	<u>7</u>	<u>7-1/2</u>
<u>1-3/8</u>	<u>7</u>	<u>7</u>	<u>8-1/4</u>
<u>1-1/2</u>	<u>7</u>	<u>8</u>	<u>9</u>

28.3.5.a. ~~(1)~~ When used for eye splices, the U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope.

28.3.6. Slings shall not be shortened with knots or bolts or other makeshift devices.

28.3.7. Sling legs shall not be kinked.

28.3.8. Slings used in a basket hitch shall have the loads balanced to prevent slippage.

28.3.9. Slings shall be padded or protected from the sharp edges of their loads.

28.3.10. Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.

28.3.11. Shock loading is prohibited.

28.3.12. A sling shall not be pulled from under a load when the load is resting on the sling.

28.3.13. Minimum sling lengths:

28.3.13.a. Cable laid and 6 × 19 and 6 × 37 slings shall have a minimum clear length of wire rope ten (10) times the component rope diameter between splices, sleeves or end fittings.

28.3.13.b. Braided slings shall have a minimum clear length of wire rope forty (40) times the component rope diameter between the loops or end fittings.

28.3.13.c. Cable laid grommets, strand laid grommets and endless slings shall have a minimum circumferential length of ninety-six (96) times their body diameter.

28.3.14. Safe operating temperatures. Fiber core wire rope slings of all grades shall be permanently removed from service if they are exposed to temperatures in excess of two hundred (200) degrees F. When nonfiber core wire rope slings of any grade are used at temperatures above four hundred (400) degrees F or below minus sixty (-60) degrees F, recommendations of the sling manufacturer regarding use at that temperature shall be followed.

28.3.15. End attachments.

28.3.15.a. Welding of end attachments, except covers to thimbles, shall be performed prior to the assembly of the sling.

28.3.15.b. All welded end attachments shall not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer shall retain a certificate of the proof test, and make it available for examination.

28.3.16. Wire rope slings shall have permanently affixed, legible identification markings stating size, rated capacity for the type(s) of hitch(es) used and the angle upon which it is based, and the number of legs if more than one.

28.4. Natural rope and synthetic fiber.

28.4.1. ~~(a) General. When using natural or synthetic fiber rope slings, Tables 21, 22, 23 and 24 shall apply.~~ Employers must not use natural- and synthetic-fiber rope slings with loads in excess of the rated capacities (i.e., working load limits) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.

28.4.2. (b) All splices in rope slings provided by the employer shall be made in accordance with fiber rope manufacturer's recommendations.

28.4.2.a. (1) In manila rope, eye splices shall contain at least three (3) full tucks, and short splices shall contain at least six (6) full tucks (three (3) on each side of the centerline of the splice).

28.4.2.b. (2) In ~~laid~~ laid synthetic fiber rope, eye splices shall contain at least four (4) full tucks, and short splices shall contain at least eight (8) full tucks (four (4) on each side of the centerline of the splice).

28.4.2.c. (3) Strand end tails shall not be trimmed short (flush with the surface of the rope) immediately adjacent to the full tucks. This precaution applies to both eye and short splices and all types of fiber rope. For fiber ropes under one (1) inch diameter, the tails shall project at least six (6) rope diameters beyond the last full tuck. For fiber ropes one (1) inch diameter and larger, the tails shall project at least six (6) inches beyond the last full tuck. In applications where the projecting tails may be objectionable, the tails shall be tapered and spliced into the body of the rope using at least two (2) additional tucks (which will require a ~~trial~~ tail length of approximately six (6) rope diameters beyond the last full tuck).

28.4.2.d. For all eye splices, the eye shall be sufficiently large to provide an included angle of not greater than sixty (60) degrees at the splice when the eye is placed over the load or support.

28.4.2.e. (4) Knots shall not be used in lieu of splices.

28.4.3. Safe operating temperatures. Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from minus twenty (-20) degrees F to plus one hundred eighty (+180) degrees F without decreasing the working load limit. For operations outside this temperature range and for wet frozen slings, the sling manufacturer's recommendations shall be followed.

28.4.4. Splicing. Spliced fiber rope slings shall not be used unless they have been spliced in accordance with the following minimum requirements and in accordance with any additional recommendations of the manufacturer:

28.4.4.a. In manila rope, eye splices shall consist of at least three (3) full tucks, and short splices shall consist of at least six (6) full tucks, three (3) on each side of the splice center line.

28.4.4.b. In synthetic fiber rope, eye splices shall consist of at least four (4) full tucks, and short splices shall consist of at least eight (8) full tucks, four (4) on each side of the center line.

28.4.4.c. Strand end tails shall not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under one (1) inch in diameter, the tail shall project at least six (6) rope diameters beyond the last full tuck. For fiber rope one (1) inch in diameter and larger, the tail shall project at least six (6) inches beyond the last full tuck. Where a projecting tail interferes with the use of the sling, the tail shall be tapered and spliced into the body of the rope using at least two (2) additional tucks (which will require a tail length of approximately six (6) rope diameters beyond the last full tuck).

28.4.4.d. Fiber rope slings shall have a minimum clear length of rope between eye splices equal to ten (10) times the rope diameter.

28.4.4.e. Knots shall not be used in lieu of splices.

28.4.4.f. Clamps not designed specifically for fiber ropes shall not be used for splicing.

28.4.4.g. For all eye splices, the eye shall be of such size to provide an included angle of not greater than sixty (60) degrees at the splice when the eye is placed over the load or support.

28.4.5. End attachments. Fiber rope slings shall not be used if end attachments in contact with the rope have sharp edges or projections.

28.4.6. Removal from service. Natural and synthetic fiber rope slings shall be immediately removed from service if any of the following conditions are present:

28.4.6.a. Abnormal wear.

28.4.6.b. Powdered fiber between strands.

28.4.6.c. Broken or cut fibers.

28.4.6.d. Variations in the size or roundness of strands.

28.4.6.e. Discoloration or rotting.

28.4.6.f. Distortion of hardware in the sling.

28.4.7. Employers must use natural- and synthetic-fiber rope slings that have permanently affixed and legible identification markings that state the rated capacity for the type(s) of hitch(es) used and the angle upon which it is based, type of fiber material, and the number of legs if more than one.

28.5. Synthetic webbing (nylon, polyester, and polypropylene).

28.5.1. ~~(a)~~ The employer shall have each synthetic web sling marked or coded to show:

28.5.1.a. ~~(1)~~ Name or trademark of manufacturer;

28.5.1.b. ~~(2)~~ Rated capacities for the type of hitch;

28.5.1.c. ~~(3)~~ Type of material.

28.5.2. ~~(b)~~ Rated capacity shall not be exceeded.

28.5.3. Webbing. Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbings width.

28.5.4. Fittings. Fittings shall be:

28.5.4.a. Of a minimum breaking strength equal to that of the sling; and

28.5.4.b. Free of all sharp edges that could in any way damage the webbing.

28.5.5. Attachment of end fittings to webbing and formation of eyes. Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.

28.5.6. Environmental conditions. When synthetic web slings are used, the following precautions shall be taken:

28.5.6.a. Nylon web slings shall not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present.

28.5.6.b. Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

28.5.6.c. Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

28.5.7. Safe operating temperatures. Synthetic web slings of polyester and nylon shall not be used at temperatures in excess of one hundred eighty (180) degrees F. Polypropylene web slings shall not be used at temperatures in excess of two hundred (200) degrees F.

28.5.8. Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present:

28.5.8.a. Acid or caustic burns;

28.5.8.b. Melting or charring of any part of the sling surface;

28.5.8.c. Snags, punctures, tears or cuts;

28.5.8.d. Broken or worn stitches; or

28.5.8.e. Distortion of fittings.

## 28.6. Shackles and hooks.

28.6.1. ~~(a)~~ Employers must not use shackles with loads in excess of the rated capacities (i.e., working load limits) indicated on the shackle by permanently affixed and legible identification markings prescribed by the manufacturer. Table 25 shall be used to determine the safe working loads of various sizes of shackles, except that higher safe working loads are permissible when recommended by the manufacturer for specific identifiable products, provided that a safety factor of not less than five (5) is maintained.

28.6.2. ~~(b)~~ The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain a record of the dates and results of such tests.

~~(c) Inspections:~~

~~\_\_\_\_\_ (1) In addition to the inspection required of this Section, a thorough periodic inspection of alloy steel chain slings in use shall be made on a regular basis, to be determined on the basis of:~~

~~\_\_\_\_\_ (i) Frequency of sling use;~~

~~\_\_\_\_\_ (ii) Severity of service conditions;~~

~~\_\_\_\_\_ (iii) Nature of lifts being made; and~~

~~\_\_\_\_\_ (iv) Experience gained on the service life of slings used in similar circumstances. Such inspection shall in no event be at intervals greater than once every twelve (12) months.~~

~~\_\_\_\_\_ (2) The employer shall make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and shall make such record available for examination. Chains shall not be used to rig load to be hoisted. This does not prevent the use of chain fill on chain hoists for test purposes.~~

~~\_\_\_\_\_ (d) Safe operating practices. Whenever any sling is used, the following practices shall be observed:~~

~~\_\_\_\_\_ (1) Slings shall not be shortened with knots or bolts or other make-shift devices.~~

~~\_\_\_\_\_ (2) Sling legs shall not be kinked.~~

~~\_\_\_\_\_ (3) Slings used in a basket hitch shall have the loads balanced to prevent slippage.~~

~~\_\_\_\_\_ (4) Slings shall be padded or protected from the sharp edges of their loads.~~

~~\_\_\_\_\_ (5) Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.~~

~~\_\_\_\_\_ (6) Shock loading is prohibited.~~

~~\_\_\_\_\_ (7) A sling shall not be pulled from under a load when the load is resting on the sling.~~

~~(e) Minimum sling lengths:~~

~~\_\_\_\_\_ (1) Cable laid and six (6) x nineteen (19) and six (6) x thirty-seven (37) slings shall have a minimum clear length of wire rope ten (10) times the component rope diameter between splices, sleeves or end fittings.~~

~~\_\_\_\_\_ (2) Braided slings shall have a minimum clear length of wire rope forty (40) times the component rope diameter between the loops or end fittings.~~

~~\_\_\_\_\_ (3) Cable laid grommets, strands laid grommets and endless slings shall have a minimum circumferential length of ninety-six (96) times their body diameter.~~

~~Safe operating temperatures. Fiber core wire rope slings of all grades shall be permanently removed from service if they are exposed to temperatures in excess of two hundred degrees (200) F. When nonfiber core wire rope slings of any grade are used at temperatures above four hundred degrees~~

~~(400) F. or below sixty degrees (60) F., recommendations of the sling manufacturer regarding use at that temperature shall be followed:~~

~~End attachments:~~

~~————— (i) Welding of end attachments, except covers to thimbles, shall be performed prior to the assembly of the sling.~~

~~————— (ii) All welded end attachments shall not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer shall retain a certificate of the proof test, and make it available for examination.~~

~~(f) Natural and synthetic fiber type slings:~~

~~————— (1) Safe operating temperatures. Natural and synthetic fiber rope slings, except wet frozen slings, may be used in a temperature rated from minus twenty degrees (-20) to plus one hundred eighty degrees (180) F. without decreasing the working load limit. For operations providing this temperature range and for set frozen slings, the sling manufacturer's recommendations shall be followed.~~

~~————— (2) Splicing. Spliced fiber rope hoists shall not be used unless they have been spliced in accordance with the following minimum requirements and in accordance with any additional recommendations of the manufacturer:~~

~~————— (i) Fiber rope slings shall have a minimum clear length of rope between eye splices equal to ten (10) times the rope diameter.~~

~~————— (ii) Clamps not designed specifically for fiber ropes shall not be used for splicing.~~

~~————— (3) End attachments. Fiber rope slings shall not be used if end attachments in contact with rope have sharp edges or projections:~~

~~————— (4) Removal from service. Natural and synthetic fiber rope sling shall be immediately removed from service if any of the following conditions are present:~~

~~————— (i) Abnormal wear;~~

~~————— (ii) Powdered fiber between strands;~~

~~————— (iii) Broken or cut fibers;~~

~~————— (iv) Variations in the size or roundness of strands;~~

~~————— (v) Discoloration or rotting;~~

~~————— (vi) Distortion of hardware in the sling.~~

~~————— (5) Webbing. Synthetic webbing shall be of uniform thickness and width and salvage edges shall not be split from the webbing's width.~~

~~————— (6) Fittings. Fittings shall be:~~

~~\_\_\_\_\_ (i) Of a minimum breaking strength equal to that of the sling, and~~

~~\_\_\_\_\_ (ii) Free of all sharp edges that could in any way damage the webbing.~~

~~\_\_\_\_\_ (7) Attachment of end fittings to webbing and formation of eyes.~~

~~\_\_\_\_\_ Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.~~

~~\_\_\_\_\_ (8) Environmental conditions. When synthetic web slings are used, the following precautions shall be taken:~~

~~\_\_\_\_\_ (i) Nylon web slings shall not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present.~~

~~\_\_\_\_\_ (ii) Polyester and polypropylene webslings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.~~

~~\_\_\_\_\_ (iii) Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.~~

~~\_\_\_\_\_ (9) Safe operating temperatures. Synthetic web slings of polyester and nylon shall not be used at temperatures in excess of one hundred eighty degrees (180) F. Polypropylene web slings shall not be used in temperatures in excess of two hundred degrees (200) F.~~

~~\_\_\_\_\_ (10) Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present:~~

~~\_\_\_\_\_ (i) Acid or caustic burns;~~

~~\_\_\_\_\_ (ii) Melting or charring of any part of the sling surface;~~

~~\_\_\_\_\_ (iii) Snags, punctures, tears or cuts;~~

~~\_\_\_\_\_ (iv) Broken or worn stitches; or~~

~~\_\_\_\_\_ (v) Distortion of fittings.~~

~~\_\_\_\_\_ (11) Scope. This section applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting in employments covered by this part. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three (3) strand construction), and synthetic web (nylon, polyester, and polypropylene).~~

#### **§36-23-29. Disposal of Waste Material.**

29.1. The area where materials are dropped more than twenty (20) feet to any point lying outside the exterior walls of the building shall be adequately restricted.

29.2. When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades not less than forty-two (42) inches high and not less than six (6) feet back from the projected edge of the opening above. Signs warning of the hazard of falling materials shall be posted at each level. Removal shall not be permitted in this lower area until debris handling ceases above.

29.3. All scrap lumber, waste material, and rubbish shall be removed from the immediate work area as the work progresses.

29.4. Disposal of waste material or debris by burning shall comply with local fire regulations.

29.5. All solvent waste, oil rags, and flammable liquids shall be kept in fire resistant covered containers until removed from work site.

### **§36-23-30. Tools -- Hand and Power.**

30.1. General requirements.

30.1.1. ~~(a)~~ Condition of tools. All hand and power tools and similar equipment, whether furnished by the employer or by the employee, shall be maintained in a safe condition. All such tools shall be inspected prior to each use and any defective tools shall be removed from service.

30.1.2. ~~(b)~~ Guarding.

30.1.2.a. ~~(1)~~ When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.

30.1.2.b. ~~(2)~~ Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating or moving parts or equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding shall meet the requirements as set forth in ANSI B15.1-1953 (R1958), Safety Code for Mechanical Power Transmission Apparatus.

30.1.3. ~~(c)~~ Personal protective equipment.

30.1.3.a. Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazard.

30.1.3.b. All personal protective equipment shall be of safe design and construction for the work to be performed. ~~All personal protective equipment shall meet the requirements and be maintained according to Sections 10-19 of these regulations.~~

30.1.4. ~~(d)~~ Switches.

30.1.4.a. All hand-held powered platen sanders, grinders with wheels two (2) inches diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks one-fourth (1/4) of an inch wide or less may be equipped with only a positive "On-Off" control.

30.1.4.b. All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and

angle grinders with wheels greater than two (2) inches in diameter, disc sanders, belt sanders, reciprocating saws, saber saws, and other similar operating powered tools shall be equipped with a momentary contact "On-Off" control and may have a lock-on control provided that turn off can be accomplished by a single motion of the same finger or fingers that turn it on.

30.1.4.c. All hand-held powered tools, such as circular saws, chain saws, and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch that will shut off the power when the pressure is released.

30.1.4.c.1. Exception: ~~This paragraph~~ Subdivision 30.1.4.c. does not apply to concrete vibrators, concrete breakers, powered tampers, jackhammers, rock drills, and similar hand operated power tools.

## 30.2. General requirements for all machines.

30.2.1. ~~(a)~~ Point of operation is the area on a machine where work is actually performed upon the material being processed.

30.2.1.a. ~~(1)~~ The point of operation of machines whose operation exposes an employee to injury shall be guarded. The guarding device shall be in conformity with any appropriate standards therefore, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his/her body in the danger zone during the operating cycle.

30.2.1.b. ~~(2)~~ Special handtools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required by this Section, but can only be used to supplement protection provided.

30.2.1.c. ~~(3)~~ The following are some of the machines which usually require point of operation guarding:

30.2.1.c.1. ~~(i)~~ Guillotine cutters

30.2.1.c.2. ~~(ii)~~ Shears

30.2.1.c.3. ~~(iii)~~ Alligator shears

30.2.1.c.4. ~~(iv)~~ Power presses

30.2.1.c.5. ~~(v)~~ Milling machines

30.2.1.c.6. ~~(vi)~~ Power saws

30.2.1.c.7. ~~(vii)~~ Jointers

30.2.1.c.8. ~~(viii)~~ Portable power tools

30.2.1.c.9. ~~(ix)~~ Forming rolls and calendars

30.2.2. ~~(b)~~ Exposure of blades. When the periphery of the blades of a fan is less than seven (7)

feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half (1/2) inch.

30.2.3. ~~(c)~~ Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

30.3. Handtools.

30.3.1. ~~(a)~~ Employers shall not issue or permit the use of unsafe handtools.

30.3.2. ~~(b)~~ Wrenches, including adjustable, pipe, end, and socket wrenches shall not be used when jaws are sprung to the point that slippage occurs.

30.3.3. ~~(c)~~ Impact tools, such as drift pins, wedges, and chisels, shall be kept free of mushroomed heads.

30.3.4. ~~(d)~~ The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

30.4. Power-operated tools.

30.4.1. ~~(a)~~ Electric power-operated tools.

30.4.1.a. ~~(1)~~ Electric power operated tools shall either be of the approved double-insulated type or grounded in accordance with ~~this part~~ §36-23-32.

30.4.1.b. ~~(2)~~ The use of electric cords for hoisting or lowering tools shall not be permitted.

30.4.2. ~~(b)~~ Pneumatic power tools.

30.4.2.a. ~~(1)~~ Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tools from becoming accidentally disconnected.

30.4.2.b. ~~(2)~~ Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

30.4.2.c. ~~(3)~~ All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than one hundred (100) p.s.i. pressure at the tool, shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

30.4.2.d. ~~(4)~~ Compressed air shall not be used for cleaning purposes except where reduced to less than thirty (30) p.s.i. and then only with effective chip guarding and personal protective equipment which ~~meets the requirements of this part~~ is designed and constructed for the work to be performed. The thirty (30) p.s.i. requirement does not apply for concrete form, mill scale and similar cleaning purposes.

30.4.2.e. ~~(5)~~ The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.

30.4.2.f. ~~(6)~~ The use of hoses for hoisting or lowering tools shall not be permitted.

30.4.2.g. ~~(7)~~ All hoses exceeding one-half (1/2) inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.

30.4.2.h. ~~(8)~~ Airless spray guns of the type which atomize paints and fluids at high pressures (one thousand (1,000) pounds or more per square inch) shall be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released.

30.4.2.i. ~~(9)~~ In lieu of the above, a diffuser nut which will prevent high pressure, high velocity release, while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection, shall be provided.

30.4.2.j. Abrasive blast cleaning nozzles. The blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.

### 30.4.3. Air receivers.

#### 30.4.3.a. General requirements.

30.4.3.a.1. Application. This Section applies to compressed air receivers and other equipment used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting and chipping. On the other hand, however, this Section does not deal with the special problems created by using compressed air to convey materials nor when employees work in compressed air as in tunnels and caissons. This Section is not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment.

#### 30.4.3.a.2. New and existing equipment.

30.4.3.a.2.A. All new air receivers installed shall be constructed in accordance with the 1968 edition of the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII.

30.4.3.a.2.B. All safety valves used shall be constructed, installed and maintained in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII, 1968 Edition.

#### 30.4.3.b. Installation and equipment requirements.

30.4.3.b.1. Installation. Air receivers shall be so installed that all drains, handholes, and manholes therein are easily accessible. Air receivers should be supported with sufficient clearance to permit a complete external inspection and to avoid corrosion of external surfaces. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place. The receiver should be located as close to the compressor or aftercooler as is possible in order to keep the discharge pipe short.

30.4.3.b.2. Drains and traps. A drain pipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water. Adequate automatic traps may be installed in addition to drain valves. The drain valve on the air receiver shall be opened and the

receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.

30.4.3.c. Gauges and valves.

30.4.3.c.1. Every air receiver shall be equipped with an indicating pressure gauge (so located as to be readily visible) and one (1) or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than ten (10) percent.

30.4.3.c.2. No valve of any type shall be placed between the air receiver and its safety valve or valves.

30.4.3.c.3. Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located and installed so that they cannot be readily rendered inoperative by any means, including the elements.

30.4.3.c.4. All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

30.4.4. ~~(c)~~ Fuel powered tools.

30.4.4.a. ~~(1)~~ All fuel powered tools shall be stopped while being refueled, serviced, or maintained, and fuel shall be transported, handled, and stored in accordance with this Subsection appropriate fire protection and prevention methods as per OSHA §1926 Subpart F - Fire Protection and Prevention.

30.4.4.b. ~~(2)~~ When fuel powered tools are used in enclosed spaces, the applicable requirements for concentrations of toxic gases and use of personal protective equipment shall apply.

30.4.5. ~~(d)~~ Hydraulic power tools.

30.4.5.a. ~~(1)~~ The fluid used in hydraulic powered tools shall be fire-resistant fluids and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.

30.4.5.b. ~~(2)~~ The manufacturer's safe operating pressures for hoses, valves, pipes, filters, and other fittings shall not be exceeded.

30.4.6. ~~(e)~~ Powder-actuated tools.

30.4.6.a. ~~(1)~~ Only employees who have been trained in the operation and the safety hazards of the particular tools in use shall be allowed to operate a powder-actuated tool.

30.4.6.b. ~~(2)~~ The tool shall be tested each day before loading to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturers recommended procedure.

30.4.6.c. ~~(3)~~ Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.

30.4.6.d. ~~(4)~~ Personal protective equipment shall be of the design and construction for the work to be performed ~~in accordance with Subsections of this part.~~

30.4.6.e. ~~(5)~~ Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employees. Hands shall be kept clear of the open barrel end.

30.4.6.f. ~~(6)~~ Loaded tools shall not be left unattended.

30.4.6.g. ~~(7)~~ Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.

30.4.6.h. ~~(8)~~ Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.

30.4.6.i. ~~(9)~~ No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.

30.4.6.j. ~~(10)~~ Tools shall not be used in an explosive or flammable atmosphere.

30.4.6.k. ~~(11)~~ All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.

30.4.6.l. ~~(12)~~ Powder-actuated tools used by employees shall meet all other applicable requirements of the American National Standards Institute A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools.

~~30.5. Other portable tools and equipment. Abrasive blast cleaning nozzles. The blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.~~

30.5. ~~30.6:~~ Abrasive wheels and tools.

30.5.1. ~~(a)~~ Power. All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.

30.5.2. ~~(b)~~ Guarding. Grinding machines, abrasive wheels, and tools used by employees shall be equipped with safety guards and shall meet other applicable requirements in conformance with ~~the requirements of~~ ANSI B7.1-1970, Safety Code for the Use, Care and Protection of Abrasive Wheels, ~~and Sections 10, 11, and 12 of these regulations.~~

30.5.3. ~~(c)~~ Use of abrasive wheels.

30.5.3.a. ~~(1)~~ Floor stand and bench mounted abrasive wheels, used for external grinding, shall be provided with safety guards (protection ~~bonds~~ hoods). The maximum angular exposure of the grinding wheel periphery and sides shall be not more than ninety (90) degrees, except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed one hundred twenty-five (125) degrees. In either case, the exposure shall begin not more

than sixty-five (65) degrees above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the effect of a bursting wheel.

30.5.3.b. ~~(2)~~ Floor and bench-mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed one-eighth (1/8) inch from the surface of the wheel.

30.5.3.c. ~~(3)~~ Cup type wheels used for external grinding shall be protected by either a revolving cup guard or a band type guard in accordance with the provisions of the ANSI B7.1-1970, Safety Code for the Use, Care, and Protection of Abrasive Wheels. All other portable abrasive wheels used for external grinding shall be provided with safety guards (protection hoods) meeting the requirements of ~~subparagraph (5) of this paragraph~~ Subdivision 30.5.3.e. of this Subsection, except as follows:

30.5.3.c.1. ~~(i)~~ When the work location makes it impossible, a wheel equipped with safety flanges, as described in ~~subparagraph six (6) of this paragraph~~ Subdivision 30.5.3.f. of this Subsection, shall be used;

30.5.3.c.2. ~~(ii)~~ When wheels two (2) inches or less in diameter which are securely mounted on the end of a steel mandrel are used.

30.5.3.d. ~~(4)~~ Portable abrasive wheels used for internal grinding shall be provided with safety flanges (protection flanges) meeting the requirements of ~~subparagraph six (6) of this paragraph~~ Subdivision 30.5.3.f. of this Subsection, except as follows:

30.5.3.d.1. ~~(i)~~ When wheels two (2) inches or less in diameter which are securely mounted on the end of a steel mandrel are used;

30.5.3.d.2. ~~(ii)~~ If the wheel is entirely within the work being ground while in use.

30.5.3.e. ~~(5)~~ When safety guards are required, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding exposure of the grinding wheel periphery and sides shall not exceed one hundred eighty (180) degrees.

30.5.3.f. ~~(6)~~ When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of accidental breakage, shall be used.

30.5.3.g. ~~(7)~~ All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure that they are free from cracks or defects.

30.5.3.h. ~~(8)~~ Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place.

30.5.3.i. ~~(9)~~ All employees using abrasive wheels shall be protected by eye protection equipment of the design and construction for the work to be performed, in accordance with the requirements of this part, except when adequate eye protection is afforded by eye shields which are permanently attached to the bench or floor stand.

~~(d) Other requirements. All abrasive wheels and tools used by employees shall meet other applicable requirements of ANSI B7.1-1970, Safety Code, for the use, care and protection of abrasive wheels.~~

### 30.6. 30.7: Woodworking tools.

30.6.1. ~~(a)~~ Disconnect switches. All fixed power driven woodworking tools shall be provided with a disconnect switch that can either be locked or tagged in the off position.

30.6.2. ~~(b)~~ Speeds. The operating speed shall be etched or otherwise permanently marked on all circular saws over twenty (20) inches in diameter or operating at over ten thousand (10,000) peripheral feet per minute. Any saw so marked shall not be operated at a speed other than that marked on the blade. When a marked saw is retensioned for a different speed, the marking shall be corrected to show the new speed.

30.6.3. ~~(c)~~ Self-feed. Automatic feeding devices shall be installed on machines whenever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points.

30.6.4. ~~(d)~~ Guarding. All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for level cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

30.6.5. ~~(e)~~ Personal protective equipment. All personal protective equipment provided for use shall ~~conform to this part~~ be of the design and construction for the work to be performed.

30.6.6. ~~(f)~~ Other requirements. All woodworking tools and machinery shall meet other applicable requirements of ANSI, O1.1-1961, Safety Code, for woodworking machinery.

### 30.6.7. Radial saws.

30.6.7.a. The upper hood shall completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The upper hood shall be constructed in such a manner and of such material that it will protect the operator from flying splinters, broken saw teeth, etc., and will deflect sawdust away from the operator. The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut to give maximum protection possible for the operation being performed.

### 30.6.8. Hand-fed crosscut table saws.

30.6.8.a. Each circular crosscut table saw shall be guarded by a hood which shall meet all the requirements of Subsection 30.6.9. for hoods for circular ripsaws.

### 30.6.9. Hand-fed ripsaws.

30.6.9.a. Each circular hand-fed ripsaw shall be guarded by a hood which shall completely

enclose the portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting shall be arranged so that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut but it shall not offer any considerable resistance to insertion of material to saw or to passage of the material being sawed. The hood shall be made of adequate strength to resist blows and strains incidental to reasonable operation, adjusting, and handling, and shall be so designed as to protect the operator from flying splinters and broken saw teeth. It shall be made of material that is soft enough so that it will be unlikely cause tooth breakage. The hood shall be so mounted as to insure that its operation will be positive, reliable, and in true alignment with the saw; and the mounting shall be adequate in strength to resist any reasonable side thrust or other force tending to throw it out of line.

30.7. ~~30.8.~~ Jacks -- lever and ratchet, screw, and hydraulic.

30.7.1. ~~(a)~~ General requirements.

30.7.1.a. ~~(1)~~ The manufacturer's rated capacity shall be legibly marked on all jacks and shall not be exceeded.

30.7.1.b. ~~(2)~~ All jacks shall have a positive stop to prevent overtravel.

~~(b) Lift slab construction:~~

~~————— (1) Hydraulic jacks used in lift slab construction shall have a safety device which will cause the jacks to support the load in any position in the event of jack malfunctions.~~

~~————— (2) If lift slabs are automatically controlled, a device shall be installed which will stop the operation when the one-half (1/2) inch leveling tolerance is exceeded.~~

30.7.2. ~~(c)~~ Blocking. When it is necessary to provide a firm foundation, the base of the jack shall be blocked or cribbed. Where there is a possibility of slippage of the metal cap of the jack, a wood block shall be placed between the cap and the load.

~~30.9. Other portable tools and equipment.~~

30.7.3. ~~(a)~~ Jacks. Operation and maintenance.

30.7.3.a. ~~(1)~~ After the load has been raised, it shall be cribbed, blocked, or otherwise secured at once.

30.7.3.b. ~~(2)~~ Hydraulic jacks exposed to freezing temperatures shall be supplied with an adequate antifreeze liquid.

30.7.3.c. ~~(3)~~ All jacks shall be properly lubricated at regular intervals. The lubricating instructions of the manufacturer should be followed, and only lubricants recommended by ~~him~~ the manufacturer should be used.

30.7.3.d. ~~(4)~~ Each jack shall be thoroughly inspected at times which depend upon the service conditions. Inspections shall be not less frequent than the following:

30.7.3.d.1. ~~(i)~~ For constant or intermittent use at one (1) locality, once every six (6)

months.

30.7.3.d.2. ~~(iii)~~ For jacks sent out of shop for special work, when sent out and when returned.

30.7.3.d.3. ~~(iii)~~ For a jack subjected to abnormal load or shock, immediately before and immediately thereafter.

30.7.3.e. ~~(5)~~ Repair or replacement parts shall be examined for possible defects.

30.7.3.f. ~~(6)~~ Jacks which are out of order shall be tagged accordingly, and shall not be used until repairs are made.

### **§36-23-31. Gas Welding and Cutting.**

31.1. Gas welding and cutting.

31.1.1. ~~(a)~~ Transporting, moving, and storing compressed gas cylinders.

31.1.1.a. ~~(1)~~ Valve protection caps shall be in place and secured.

31.1.1.b. ~~(2)~~ When cylinders are hoisted, they shall be secured on a cradle, slingboard, or pallet. They shall not be hoisted or transported by means of magnets or ~~chocker~~ choker slings.

31.1.1.c. ~~(3)~~ Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck, or permitted to strike each other violently.

31.1.1.d. ~~(4)~~ When cylinders are transported by powered vehicles, they shall be secured in a vertical position.

31.1.1.e. ~~(5)~~ Valve protection caps shall not be used for lifting cylinders from one (1) vertical position to another. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen. Warm, not boiling, water shall be used to thaw cylinders loose.

31.1.1.f. ~~(6)~~ Unless cylinders are firmly secured on a special carrier on vehicle intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.

31.1.1.g. ~~(7)~~ A suitable cylinder truck, chain, or other steadying device shall be used to keep cylinders from being knocked over while in use.

31.1.1.h. ~~(8)~~ When work is finished, when cylinders are empty, or when cylinders are moved at any time, the cylinder valve shall be closed.

31.1.1.i. ~~(9)~~ Compressed gas cylinders shall be secured in an upright position at all times, except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

31.1.1.j. Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of twenty (20) feet or by a noncombustible barrier at least five (5) feet high having a fire-resistance rating of at least one-half hour.

31.1.1k. Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least twenty (20) feet from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage places shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

31.1.2. (b) Placing cylinders.

31.1.2.a. (1) Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame will not reach them. When this is impractical, fire-resistant shields shall be provided.

31.1.2.b. (2) Cylinders shall be placed where they cannot become part of an electrical circuit. Electrodes shall not be struck against a cylinder to strike an arc.

31.1.2.c. (3) Fuel gas cylinders shall be placed with valve end up whenever they are in use. They shall not be placed in a location where they would be subject to open flame, hot metal, or other sources of artificial heat.

31.1.2.d. (4) Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces.

31.1.3. (c) Treatment of cylinders.

31.1.3.a. (1) Cylinders, whether full or empty, shall not be used as rollers or supports.

31.1.3.b. (2) No person other than the gas supplier shall attempt to mix gases in a cylinder. No one except the owner of the cylinder or person authorized by him/her, shall refill a cylinder. No one shall use a cylinder's contents for purposes other than those intended by the supplier.

31.1.3.c. (3) No damaged or defective cylinder shall be used.

31.1.4. (d) Use of fuel gas. The employer shall thoroughly instruct employees in the safe use of fuel gas, as follows:

31.1.4.a. (1) Before a regulator to a cylinder valve is connected, the valve shall be opened slightly and closed immediately. (This action is generally termed "Cracking" and is intended to clear the valve of dust or dirt that might otherwise enter the regulator.) The person cracking the valve shall stand to one side of the outlet, not in front of it. The valve of a fuel gas cylinder shall not be cracked where the gas would reach welding work, sparks, flame, or other possible sources of ignition.

31.1.4.b. (2) The cylinder valve shall always be opened slowly to prevent damage to the regulator. For quick closing, valves on fuel gas cylinders shall not be opened more than one and one-half (1-1/2) turns. When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency. In the case of manifolded or coupled cylinders, at least one (1) such wrench shall always be available for immediate use. Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.

31.1.4.c. ~~(3)~~ Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.

31.1.4.d. ~~(4)~~ Before a regulator is removed from a cylinder valve, the cylinder valve shall always be closed and the gas released from the regulator.

31.1.4.e. ~~(5)~~ If, when the valve on a fuel gas cylinder is opened, there is found to be a leak around the valve stem, the valve shall be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder shall be discontinued, and it shall be properly tagged and removed from the work area. In the event that fuel gas should leak from the cylinder valve rather than from the valve stem, and the gas cannot be shut off, the cylinder shall be properly tagged and removed from the work area. If a regulator attached to a cylinder valve will effectively stop a leak through the valve seat, the cylinder need not be removed from the work area.

31.1.4.f. ~~(6)~~ If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.

31.1.5. ~~(e)~~ Fuel gas and oxygen manifolds.

31.1.5.a. ~~(1)~~ Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least one (1) inch high which shall be either painted on the manifold or on a sign permanently attached to it.

31.1.5.b. ~~(2)~~ Fuel gas and oxygen manifolds shall be placed in safe, well ventilated, and accessible locations. They shall not be located within enclosed spaces.

31.1.5.c. ~~(3)~~ Manifold hose connections, including both ends of the supply hose that lead to the manifold, shall be such that the hose cannot be interchanged between fuel gas and oxygen manifolds and supply header connections. Adapters shall not be used to permit the interchange of hoses. Hose connections shall be kept free of grease and oil.

31.1.5.d. ~~(4)~~ When not in use, manifold and header hose connections shall be capped.

31.1.5.e. ~~(5)~~ Nothing shall be placed on top of a manifold when in use which will damage the manifold or interfere with the quick closing of the valves.

31.1.6. ~~(f)~~ Hose.

31.1.6.a. ~~(1)~~ Fuel gas hose and oxygen hose shall be easily distinguishable from each other. The contrast may be made by different colors or by surface characteristics readily distinguishable by the sense of touch. Oxygen and fuel gas hoses shall not be interchangeable. A single hose having more than one (1) passage shall not be used.

31.1.6.b. ~~(2)~~ When parallel sections of oxygen and fuel gas hoses are taped together not more than four (4) inches out of twelve (12) inches shall be covered by tape.

31.1.6.c. ~~(3)~~ All hoses in use, carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas or substance which may ignite or enter into combustion, or be in any way harmful to employees, shall be inspected at the beginning of each working shift. Defective hoses, or a hose in

doubtful condition, shall not be used.

31.1.6.d. ~~(4)~~ Hose which has been subject to flashback, or which shows evidence of severe wear or damage, shall be tested to twice the normal pressure to which it is subject, but in no case less than three hundred (300) p.s.i. Defective hoses, or a hose in doubtful condition, shall not be used.

31.1.6.e. ~~(5)~~ Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.

31.1.6.f. ~~(6)~~ Boxes used for the storage of gas hoses shall be ventilated.

31.1.6.g. ~~(7)~~ Hoses, cables, and other equipment shall be kept clear of passageways, ladders and stairs.

31.1.7. ~~(8)~~ Torches.

31.1.7.a. ~~(1)~~ Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills, or other devices designed for such purposes.

31.1.7.b. ~~(2)~~ Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings, and tip connections. Defective torches shall not be used.

31.1.7.c. ~~(3)~~ Torches shall be lighted by friction lighters or other approved devices, and not by matches or from hot work.

31.1.8. ~~(4)~~ Regulators and gauges. Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.

31.1.9. ~~(5)~~ Oil and grease hazards. Oxygen cylinders and fittings shall be kept away from oil or grease. Cylinders, cylinder caps and valves, couplings, regulators, hoses, and apparatus shall be kept free from oil or greasy substances and shall not be handled with oily hands or gloves. Oxygen shall not be directed at oily surfaces, greasy clothes, or within a fuel oil or other storage tank or vessel.

31.1.10. ~~(6)~~ For additional details not covered in this Section, applicable technical portions of American National Standards Institute Z49.1-1967, Safety in Welding and Cutting, shall apply.

## 31.2. Arc welding and cutting.

31.2.1. ~~(a)~~ Manual electrode holders.

31.2.1.a. ~~(1)~~ Only manual electrode holders which are specifically designed for arc welding and cutting, and are of a capacity capable of safely handling the maximum rated current required by the electrodes, shall be used.

31.2.1.b. ~~(2)~~ Any current-carrying parts passing through the portion of the holder which the arc welder or cutter grips in his/her hand, and the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

31.2.2. ~~(b)~~ Welding cables and connectors.

31.2.2.a. ~~(1)~~ All arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements of the work in progress, taking into account the duty cycle under which the arc welder or cutter is working.

31.2.2.b. ~~(2)~~ Only cable free from repair or splices for a minimum distance of ten (10) feet from the cable end to which the electrode holder is connected shall be used, except that cables with standard insulated connectors or with splices whose insulating quality is equal to that of the cable are permitted.

31.2.2.c. ~~(3)~~ When it becomes necessary to connect or splice lengths of cable one (1) to another, substantial insulated connectors of a capacity at least equivalent to that of the cable shall be used. If connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact, and the exposed metal parts of the lugs shall be completely insulated.

31.2.2.d. ~~(4)~~ Cables in need of repair shall not be used. When a cable other than the cable lead referred to in ~~subparagraph (2) of this paragraph~~ Subdivision 31.2.2.b. of this Subsection, becomes worn to the extent of exposing bare conductors, the portion thus exposed shall be protected by means of rubber and friction tape or other equivalent insulation.

31.2.3. ~~(e)~~ Ground returns and machine grounding.

31.2.3.a. ~~(1)~~ A ground return cable shall have a safe current carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit which it services. When a single ground return cable services more than one (1) unit, its safe current-carrying capacity shall equal or exceed the total specified maximum output capacities of all the units which it services.

31.2.3.b. ~~(2)~~ Pipelines containing gases or flammable liquids, or conduits containing electrical circuits, shall not be used as a ground return. For welding on natural gas pipelines, the technical portions of regulations issued by the Department of Transportation, ~~Office of Pipeline Safety,~~ 49 CFR Part 192, ~~Minimum Federal Safety Standards for Gas Pipelines,~~ shall apply.

31.2.3.c. ~~(3)~~ When a structure or pipeline is employed as a ground return circuit, it shall be determined that the required electrical contact exists at all joints. The generation of an arc, sparks, or heat at any point shall cause rejection of the structures as a ground circuit.

31.2.3.d. ~~(4)~~ When a structure or pipeline is continuously employed as a ground return circuit, all joints shall be bonded, and periodic inspections shall be conducted to ensure that no condition of electrolysis or fire hazard exists by virtue of such use.

31.2.3.e. ~~(5)~~ The frames of all arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current. Grounding circuits, other than by means of a structure, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

31.2.3.f. ~~(6)~~ All ground connections shall be inspected to ensure that they are mechanically strong and electrically adequate for the required current.

31.2.4. ~~(d)~~ Operating instructions. Employers shall instruct employees in the safe means of arc

welding and cutting as follows:

31.2.4.a. ~~(1)~~ When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with employees or conducting objects.

31.2.4.b. ~~(2)~~ Hot electrode holders shall not be dipped in water; to do so may expose the arc welder or cutter to electric shock.

31.2.4.c. ~~(3)~~ When the arc welder or cutter has occasion to leave his/her work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved, the power supply switch to the equipment shall be ~~opened~~ deenergized.

31.2.4.d. ~~(4)~~ Any faulty or defective equipment shall be reported to the supervisor, and shall be removed from service if an imminent hazard exists.

~~(5) Other requirements, as outlined in Article G30, National Electrical Code NFPA 70-1971; ANSI C1-1971 (Rev. of 1968), Electric Welders, shall be used when applicable.~~

31.2.5. ~~(e)~~ Shielding. When practicable, all arc welding and cutting operations shall be shielded by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

### 31.3. Fire prevention.

31.3.1. ~~(a)~~ When practical, objects to be welded, cut or heated shall be moved to a designated safe location or, if the objects to be welded, cut or heated cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place, or otherwise protected.

31.3.2. ~~(b)~~ If the object to be welded, cut, or heated cannot be moved and if all the fire hazards cannot be removed, positive means shall be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.

31.3.3. ~~(c)~~ No welding, cutting, or heating shall be done where the application of flammable paints, or the presence of other flammable compounds, or heavy dust concentrations creates a hazard.

31.3.4. ~~(d)~~ Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use.

31.3.5. ~~(e)~~ When the welding, cutting, or heating operation is such that normal fire prevention precautions are not sufficient, additional personnel shall be assigned to guard against fire while the actual welding, cutting, or heating operation is being performed, and for a sufficient period of time after completion of the work to ensure that no possibility of fire exists. Such personnel shall be instructed as to the specific anticipated fire hazards and how the fire-fighting equipment provided is to be used.

31.3.6. ~~(f)~~ When welding, cutting, or heating is performed on walls, floors, and ceilings, since direct penetration of sparks or heat transfer may introduce a fire hazard to an adjacent area, the same precautions shall be taken on the opposite side as are taken on the side on which the welding is being performed.

31.3.7. ~~(g)~~ In areas that may contain methane gas, an examination for gas shall be conducted with ~~permissible flame safety lamps or other~~ an approved detectors before and during welding.

31.3.8. ~~(h)~~ For the elimination of possible fire in enclosed spaces as a result of gas escaping through leaking or improperly closed torch valves, the gas supply to the torch shall be positively shut off at some point outside the enclosed space whenever the torch is not to be used or whenever the torch is left unattended for a substantial period of time, such as during the lunch period. Overnight and at the change of shifts, the torch and hose shall be removed from the confined space. Open end fuel gas and oxygen hoses shall be immediately removed from enclosed spaces when they are disconnected from the torch or other gas-consuming device.

31.3.9. ~~(i)~~ Except when the contents are being removed or transferred, drums, pails, and other containers which contain or have contained flammable liquids shall be kept closed. Empty containers shall be removed to a safe area apart from hot work operations or open flames.

31.3.10. ~~(j)~~ Drums, containers, or hollow structures which have contained toxic or flammable substances shall, before welding, cutting, or heating is undertaken on them, either be filled with water or thoroughly cleaned of such substances and ventilated and tested. For welding, cutting, and heating on steel pipelines containing natural gas, the pertinent portions of regulations issued by the Department of Transportation, ~~Office of Pipeline Safety, 49 CFR Part 192, Minimum Federal Safety Standards for Gas Pipelines,~~ shall apply.

31.3.11. Before heat is applied to a drum, container, or hollow structure, a vent or opening shall be provided for the release of any built-up pressure during the application of heat.

#### 31.4. Ventilation and protection in welding, cutting and heating.

31.4.1. ~~(a)~~ Mechanical ventilation. For purposes of this Section, mechanical ventilation shall meet the following requirements:

31.4.1.a. ~~(1)~~ Mechanical ventilation shall consist of either general mechanical ventilation systems or local exhaust systems.

31.4.1.b. ~~(2)~~ General mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fuels and smoke within safe limits, as defined in this ~~part~~ Section.

31.4.1.c. ~~(3)~~ Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits as defined in ~~this part~~ OSHA §1926 Subpart D - Occupational Health and Environmental Controls.

31.4.1.d. ~~(4)~~ Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air.

31.4.1.e. ~~(5)~~ All air replacing that withdrawn shall be clean and respirable.

31.4.1.f. ~~(6)~~ Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.

31.4.2. ~~(b)~~ Welding, cutting, and heating in confined spaces.

31.4.2.a. ~~(1)~~ Except as provided in ~~subparagraph (2) of this paragraph~~ Subdivision 31.4.2.b. and ~~paragraph (c)(2) of this section~~ Subdivision 31.4.3.b., either general mechanical or local exhaust ventilation meeting the requirements of ~~paragraph (a) of this section~~ Subsection 31.4.1. shall be provided whenever welding, cutting, or heating is performed in a confined space.

31.4.2.b. ~~(2)~~ When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space shall be protected by air line respirators in accordance with the requirements of ~~this part~~ OSHA §1926 Subpart E - Personal Protective and Life Saving Equipment, and an employee on the outside of such a confined space shall be assigned to maintain communication with those working within it and to aid them in an emergency.

31.4.3. ~~(c)~~ Welding, cutting, or heating of metals of toxic significance.

31.4.3.a. ~~(1)~~ Welding, cutting, or heating in any enclosed spaces involving the metals specified in this ~~subparagraph~~ Subdivision shall be performed with either general mechanical or local exhaust ventilation meeting the requirements of ~~paragraph (i) of this section~~ Subsection 31.4.1.:

31.4.3.a.1. ~~(i)~~ Zinc-bearing base or filler metals or metals coated with zinc-bearing materials;

31.4.3.a.2. ~~(ii)~~ Lead base metals;

31.4.3.a.3. ~~(iii)~~ Cadmium-bearing filler materials;

31.4.3.a.4. ~~(iv)~~ Chromium-bearing metals or metals coated with chromium-bearing materials.

31.4.3.b. ~~(2)~~ Welding, cutting, or heating in any enclosed spaces involving the metals specified in this ~~subparagraph~~ Subdivision shall be performed with local exhaust ventilation in accordance with the requirements of ~~paragraph (a) of this section~~ Subsection 31.4.1., or employees shall be protected by air line respirators in accordance with the requirements of ~~this part~~ OSHA §1926 Subpart E - Personal Protective and Life Saving Equipment.

31.4.3.b.1. ~~(i)~~ Metals containing lead, other than as an impurity, or metal coated with lead-bearing materials;

31.4.3.b.2. ~~(ii)~~ Cadmium-bearing or cadmium-coated base metals;

31.4.3.b.3. ~~(iii)~~ Metals coated with mercury-bearing materials;

31.4.3.b.4. ~~(iv)~~ Beryllium-containing base or filler metals. Because of its high toxicity, work involving beryllium shall be done with both local exhaust ventilation and air line respirators.

31.4.3.c. ~~(3)~~ Employees performing such operations in the open air shall be protected by filter-type respirators in accordance with the requirements of ~~this Section~~ OSHA §1926 Subpart E - Personal Protective and Life Saving Equipment, except that employees performing such operations on beryllium-containing base or filler metals shall be protected by air line respirators in accordance with the requirements of ~~this part~~ OSHA §1926 Subpart E - Personal Protective and Life Saving Equipment.

31.4.3.d. ~~(4)~~ Other employees exposed to the same atmosphere as the welders or burners shall be protected in the same manner as the welder or burner.

31.4.4. ~~(d)~~ Inert-gas metal-arc welding.

31.4.4.a. ~~(1)~~ Since the inert-gas metal-arc welding process involves the production of ultra-violet radiation of intensities of five (5) to thirty (30) times that produced during shielded metal-arc welding, the decomposition of chlorinated solvents by ultra-violet rays, and the liberation of toxic fumes and gases, employees shall not be permitted to engage in or be exposed to the process until the following special precautions have been taken:

31.4.4.a.1. ~~(i)~~ The use of chlorinated solvents shall be kept at least two hundred (200) feet, unless shielded, from the exposed arc, and surfaces prepared with chlorinated solvents shall be thoroughly dry before welding is permitted on such surfaces.

31.4.4.a.2. ~~(ii)~~ Employees in the area not protected from the arc by screening shall be protected by filter lenses meeting the requirements of OSHA §1926 Subpart E - Personal Protective and Life Saving Equipment. When two (2) or more welders are exposed to each other's arc, filter lens goggles of a suitable type meeting the requirements of OSHA §1926 Subpart E - Personal Protective and Life Saving Equipment shall be worn under welding helmets. Hand shields to protect the welder against flashes and radiant energy shall be used when either the helmet is lifted or the shield is removed.

31.4.4.a.3. ~~(iii)~~ Welders and other employees who are exposed to radiation shall be suitably protected so that the skin is covered completely to prevent burns and other damage by ultra-violet rays. Welding helmets and hand shield shall be free of leaks and openings, and free of highly reflective surfaces.

31.4.4.a.4. ~~(iv)~~ When inert-gas metal-arc welding is being performed on stainless steel, the requirements of ~~paragraph (c)(2) of this section~~ Subdivision 31.4.3.b. shall be met to protect against dangerous concentrations of nitrogen dioxide.

31.4.5. ~~(e)~~ General welding, cutting, and heating.

31.4.5.a. ~~(1)~~ Welding, cutting, and heating, not involving conditions or materials described in ~~paragraph (b), (c), or (d)~~ Subsections 31.4.2., 31.4.3., or 31.4.4., may normally be done without mechanical ventilation or respiratory protective equipment, but where, because of unusual physical or atmospheric conditions, an unsafe accumulation of contaminants exists, suitable mechanical ventilation or respiratory protective equipment shall be provided.

31.4.5.b. ~~(2)~~ Employees performing any type of welding, cutting, or heating shall be protected by suitable eye protective equipment.

31.5. Welding, cutting, and heating in way of preservative coatings.

31.5.1. ~~(a)~~ Before welding, cutting, or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Preservative coatings shall be considered to be highly flammable when scraping burn with extreme rapidity.

31.5.2. ~~(b)~~ Precautions shall be taken to prevent ignition of highly flammable hardened

preservative coatings. When coatings are determined to be highly flammable, they shall be stripped from the area to be heated to prevent ignition.

31.5.3. ~~(c)~~ Protection against toxic preservative coatings.

31.5.3.a. ~~(1)~~ In enclosed spaces, all surfaces covered with toxic preservatives shall be stripped of all toxic coatings for a distance of at least four (4) inches from the area of heat application, or the employees shall be protected by air line respirators.

31.5.3.b. ~~(2)~~ In the open air, employees shall be protected by a respirator.

31.5.4. ~~(d)~~ The preservative coatings shall be removed a sufficient distance from the area to be heated to ensure that the temperature of the unstripped metal will not be appreciably raised. Artificial cooling of the metal surrounding the heating area may be used to limit the size of the area required to be cleaned.

**§36-23-32. Electrical.**

32.1. All persons performing electrical work at construction projects shall be certified by the State Fire Marshal Marshal or by the ~~Department of Mines~~ Office of Miners' Health, Safety and Training.

32.2. ~~32.1.~~ General requirements.

32.2.2. ~~(a)~~ All electrical work, installation, and wire capacities shall be in accordance with the pertinent provisions of the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of C1-1968) unless otherwise provided by ~~these regulations~~ this rule.

32.2.3. ~~(b)~~ Applicability. ~~These regulations apply~~ This rule applies only to electrical installations ~~and~~ used on the job site, both temporary and permanent. For power distribution and transmission lines, refer to Subpart V of OSHA Safety and Health Regulations for Construction.

32.2.4. ~~(c)~~ Protection of employees.

32.2.4.a. ~~(1)~~ No employer shall permit an employee to work in such proximity to any part of an electric power circuit that he/she may contact the same in the course of his/her work unless the employee is protected against electric shock by deenergizing the circuit and grounding it or by guarding it by effective insulation or other means. In work areas where the exact location of underground electric power lines is unknown, ~~workmen~~ workers using jackhammers, bars, or other hand tools which may contact a line shall be provided with insulated protective gloves.

32.2.4.b. ~~(2)~~ Before work is begun, the employer shall ascertain by inquiry or direct observation, or by instruments, whether any part of an electric power circuit, exposed, or concealed, is so located that the performance of the work may bring any person, tool, or machine into physical or electrical contact therewith. The employer shall post and maintain proper warning signs where such a circuit exists. He/she shall advise ~~his~~ employees of the location of such lines, the hazards involved and the protective measures to be taken.

32.2.4.c. Dry insulating platforms of rubber or other suitable nonconductive material shall be kept in place at each switchboard and at stationary machinery where shock hazards exist.

32.2.5. ~~(d)~~ Passageways and open spaces. Suitable barriers or other means shall be provided to ensure that work space for electrical equipment will not be used as a passageway during periods when energized parts of electrical equipment are used.

32.2.6. ~~(e)~~ Work space around equipment. Sufficient space shall be provided and maintained in the area of electrical equipment to permit ready and safe operation and maintenance of such equipment. When parts are exposed, the minimum clearance for the work space shall be not less than six and one-quarter (6-1/4) feet high, nor less than a radius of three (3) feet wide, and there shall be clearance sufficient to permit at least ninety degrees (90) opening of all doors or hinged panels. All working clearances shall be maintained in accordance with Article 110-16, National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of C1-1968).

32.2.7. ~~(f)~~ Load ratings. In existing installation no changes in circuit protection shall be made to increase the load in excess of load rating of the circuit wiring, as specified in National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of C1-1968) (Article 310.)

32.2.8. ~~(g)~~ Lockout and tagging of circuits.

32.2.8.a. ~~(1)~~ Equipment or circuits that are deenergized shall be rendered inoperative, be suitably tagged and have tags attached at all points where such equipment or circuits can be energized before work is done on such circuits and equipment, except when necessary for troubleshooting or testing.

32.2.8.b. ~~(2)~~ Tags shall be placed to identify plainly the equipment or circuits being worked on.

32.2.9. Troubleshooting or testing.

32.2.9.a. When performing electrical troubleshooting or testing on an energized electrical circuit, gloves rated for the maximum voltage of the circuit shall be worn when handling electrical testing equipment or once the plane of the electrical enclosure is broken.

32.2.9.b. No electrical troubleshooting or testing shall be performed on low-, medium-, or high-voltage distribution circuits or equipment, except by a qualified person or by a person trained to perform electrical work and to maintain electrical equipment under the immediate supervision of a qualified person.

32.2.9.c. Before electrical troubleshooting or testing a low- or medium-voltage circuit contained in a compartment with a high voltage circuit, the high-voltage circuit must be deenergized, disconnected, grounded, locked out and tagged.

32.2.9.d. While electrical troubleshooting or testing is being done on equipment with energized circuits exposed, other repairs or maintenance shall not be performed on the equipment with the exposed circuit.

32.2.9.e. All test instruments and their accessories shall be rated and designed for the environment to which they will be exposed and for the manner in which they will be utilized.

32.2.10. Insulated gloves and other personal protective equipment must:

32.2.10.a. Have a voltage rating that meets or exceeds ASTM F496-97 -- "Standard Specification for In-Service Care of Insulating Gloves and Sleeves" (1997).

32.2.10.b. Be examined before each use for visible signs of damage.

32.2.10.c. Leather protectors must always be worn with insulated rubber gloves.

32.2.10.d. Be removed from service or destroyed when damaged or defective.

32.2.10.e. Class 0 gloves used at one thousand (1000) volts or less must be electrically tested every six (6) months when in use and every year when not in use and properly stored. A record of these gloves must be kept in a book prescribed by the Director and made available for inspection by interested persons.

32.2.10.f. Gloves used in conjunction with a hot stick and with high-voltage fault finders must be electrically tested six (6) months after initial use and every year when properly stored and not in use. A record of these gloves must be kept in a book prescribed by the Director and made available for inspection by interested persons.

32.2.10.g. Hot sticks are required to be electrically tested every twelve (12) months. A record of the tests must be kept in a book prescribed by the Director and made available for inspection by interested persons.

32.2.11. (h) Ground-fault protection.

32.2.11.a. General. The employer shall use either ground fault circuit interrupters as specified in Subdivision 32.2.11.b. or an assured equipment grounding conductor program as specified in Subdivision 32.2.11.c. to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors. (1) General. Notwithstanding any other provision of this part, the requirements in Section 210-7 of the 1971 National Electrical Code (NFPA 70-1971; ANSI C1-1971), that all fifteen (15-) and twenty (20-) ampere receptacle outlets on single-phase circuits for construction sites have approved ground-fault circuit protection for personnel does not apply. In lieu thereof, the employer shall use either ground-fault circuit interrupters or an assured equipment grounding conductor program to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.

32.2.11.b. (2) Ground-fault circuit interrupters. All one hundred twenty (120) volt, single-phase, fifteen (15) and twenty (20) ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. Receptacles on a two (2) wire, single-phase portable or vehicle-mounted generator rated not more than five (5) kw, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault circuit interrupters.

32.2.11.c. (3) Assured equipment grounding conductor program. The employer shall establish and implement an assured equipment grounding conductor program on construction sites covering all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and equipment connected by cord and plug which are available for use or used by employees. This program shall comply with the following minimum requirements:

32.2.11.c.1. ~~(i)~~ A written description of the program, including the specific procedures adopted by the employer, shall be available at the job site for inspection ~~and copying by the Director and any affected employee~~ by interested persons.

32.2.11.c.2. ~~(ii)~~ The employer shall designate one (1) or more competent persons to implement the program.

32.2.11.c.3. ~~(iii)~~ Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage, and for indication of possible internal damage. Equipment found damaged or defective must be suitably tagged and may not be used until repaired.

32.2.11.c.4. ~~(iv)~~ The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and cord and plug-connected equipment required to be grounded:

32.2.11.c.4.A. ~~(a)~~ All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.

32.2.11.c.4.B. ~~(b)~~ Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

32.2.11.c.5. ~~(v)~~ All required tests shall be performed:

32.2.11.c.5.A. ~~(a)~~ Before first use;

32.2.11.c.5.B. ~~(b)~~ Before equipment is returned to service following any repairs;

32.2.11.c.5.C. ~~(c)~~ Before equipment is used after any incident which can be reasonably suspected to have caused damage (for example, when a cord set is run over); and

32.2.11.c.5.D. All electrical equipment shall be examined monthly, tested and properly maintained by a qualified person. ~~(d) At intervals not to exceed three (3) months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding six (6) months.~~

32.2.11.c.6. ~~(vi)~~ The employer may not make available or permit the use by employees of any equipment which has not met the requirements of this Section.

32.2.11.c.7. ~~(vii)~~ Tests performed as required in this Section shall be recorded in a book approved by the ~~Department of Mines~~ Office of Miners' Health, Safety and Training. This test record shall identify each receptacle, cord set, and cord-and plug-connected equipment that passed the test, and shall indicate the last date it was tested or the interval for which it was tested. This record shall be kept by means of logs, color coding, or other effective means, and shall be maintained until replaced by a more current record. The record shall be made available on the job site for inspection by ~~any affected employee~~ interested persons.

### 32.3. Testing, maintenance and repair of electrical equipment.

32.3.1. All electrical equipment, except circuit breakers, shall be examined daily by a competent person to assure safe operating condition.

32.3.2. All electrical equipment shall be examined monthly, tested and properly maintained by a certified electrician.

32.3.3. When a potential dangerous condition is found on electrical equipment, such equipment shall be removed from service until the condition is corrected by a certified electrician.

32.3.4. A record of such examination and the action taken when the potential dangerous condition is found shall be kept and made available to an authorized representative of the Director and to the miners at such mine.

32.4. ~~32.3.~~ Grounding and bonding.

32.4.1. ~~(a)~~ Portable and/or cord plug connected equipment.

32.4.1.a. ~~(1)~~ The noncurrent-carrying metal parts of portable and/or plug-connected equipment shall be grounded.

3.2.4.1.b. ~~(2)~~ Portable tools and appliances protected by an approved system of double insulation, or its equivalent, need not be grounded. Where such an approved system is employed, the equipment shall be distinctively marked.

32.4.2. ~~(b)~~ Fixed equipment. Exposed noncurrent-carrying metal parts of fixed electrical equipment, including motors, generators, frames and tracks of electrically operated cranes, electrically driven machinery, etc., shall be grounded.

32.4.3. ~~(c)~~ Effective grounding. The path from circuits, equipment, structures, and conduit or enclosures to ground shall be permanent and continuous; have ample carrying capacity to conduct safely the current liable to be imposed on it; and have impedance sufficiently low to limit the potential above ground and to result in the operation of the overcurrent devices in the circuit.

32.4.4. ~~(d)~~ Ground resistance. Driven rod electrodes shall, where practicable, have a resistance to ground not to exceed twenty-five (25) ohms. Where the resistance is not as low as twenty-five (25) ohms, two (2) or more electrodes connected in parallel shall be used.

32.4.5. ~~(e)~~ Testing of grounds. Grounding circuits shall be checked to ensure that the circuit between the ground and the grounded power conductor has a resistance which is low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

32.4.6. ~~(f)~~ Extension cords. Extension cords used with portable electric tools and appliances shall be of the three (3) wire type.

32.4.7. ~~(g)~~ Bonding. Conductors used for bonding and grounding stationary and movable equipment shall be of ample size to carry the anticipated current.

32.4.7.a. When attaching bonding and grounding clamps or clips, a secure and positive metal-to-metal contact shall be made. Such attachments shall be made before closures are opened and material movements are started and shall not be broken until after material movements are stopped

and closures are made.

32.4.8. ~~(h)~~ Temporary wiring. All temporary wiring shall be effectively grounded in accordance with the National Electrical Code, NFPA 70-1971; ANSI CI-1971 (Rev. of CI-1968), Articles 305 and 310.

32.4.9. ~~(i)~~ Construction site. Precautions shall be taken to make any necessary open wiring inaccessible to unauthorized personnel.

32.4.10. ~~(j)~~ Temporary lighting. Temporary lights shall be equipped with guards to prevent accidental contact with the bulb, except that guards are not required when the construction of the reflector is such that the bulb is deeply recessed.

32.4.10.a. Temporary lights shall be equipped with heavy duty electric cords with connections and insulation maintained in safe condition. Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this means of suspension. Splices shall have insulation equal to that of the cable.

32.4.10.b. Working spaces, walkways, and similar locations shall be kept clear of cords so as not to create a hazard to employees.

32.4.10.c. Portable electric lighting used in moist and/or other hazardous locations, ~~as~~ for example, drums, tanks, and vessels, shall be operated at a maximum of twelve (12) volts.

32.5. ~~32.4.~~ Equipment installation and maintenance.

32.5.1. ~~(a)~~ Flexible cable and cords.

32.5.1.a. ~~(1)~~ Receptacles for attachment plugs shall be of approved, concealed contact type with a contact for extending ground continuity and shall be so designed and constructed that the plug may be pulled out without leaving any live parts exposed to accidental contact.

32.5.1.b. ~~(2)~~ Where different voltages, frequencies, or types of current (AC or DC) are to be supplied by portable cords, receptacles shall be of such design that attachment plugs used on such circuits are not interchangeable.

32.5.1.c. ~~(3)~~ Attachment plugs or other connectors supplying equipment at more than three hundred (300) volts shall be of the skirted type or otherwise so designed that arcs will be confined.

32.5.1.d. ~~(4)~~ Attachment plugs for use in work areas shall be so constructed that they will endure rough use and be equipped with a suitable cord grip to prevent strain on the terminal screws.

32.5.1.e. ~~(5)~~ Flexible cord shall be used only in continuous lengths without splice, except suitable molded or vulcanized splices may be used where properly made, and the insulation shall be equal to the cable being spliced and wire connections soldered.

32.5.1.f. ~~(6)~~ Trailing cables shall be protected from damage.

32.5.1.g. ~~(7)~~ Splices in trailing cable shall be mechanically strong components and insulated to retain the mechanical and dielectric strength of the original cable.

32.5.1.h. ~~(8)~~ Cable passing through work areas shall be covered or elevated to protect it from damage which would create a hazard to employees.

32.5.1.i. ~~(9)~~ Handlamps of the portable type shall be of the molded composition or other type approved for the purpose. Brass-shell, paper-lined lampholders shall not be used. Handlamps shall be equipped with a handle and a substantial guard over the bulb and attached to the lampholder or the handle.

32.5.1.j. ~~(10)~~ Worn or frayed electric cables shall not be used.

32.5.1.k. ~~(11)~~ Extension cords shall be protected against accidental damage as may be caused by traffic, sharp corners, or projections and pinching in doors or elsewhere.

32.5.1.l. ~~(12)~~ Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.

32.5.2. ~~(b)~~ Overcurrent protection.

32.5.2.a. ~~(1)~~ Overcurrent protection shall be provided by fuses or circuit breakers for each feeder and branch circuit, and shall be based on the current-carrying capacity of the conductors supplied and the power load being used.

32.5.2.b. ~~(2)~~ No overcurrent devices shall be placed in any permanently grounded conductor, except where the overcurrent device simultaneously opens all conductors of the circuit or for motor running protection.

32.5.2.c. ~~(3)~~ When fuses are installed or removed with one (1) or both terminals energized, special tools insulated for the voltage shall be used.

32.5.3. ~~(c)~~ Switches, circuit breakers, and disconnecting means.

32.5.3.a. ~~(1)~~ Each disconnecting means for motors and appliances, and each service feeder or branch circuit at the point where it originates, shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident.

32.5.3.b. ~~(2)~~ Disconnecting means shall be located or shielded so that employees will not be injured.

32.5.3.c. ~~(3)~~ Boxes for disconnecting means shall be securely and rigidly fastened to the surface upon which they are mounted and fitted with covers.

32.5.3.d. ~~(4)~~ Boxes and disconnecting means installed in damp or wet locations shall be waterproof to the extent that water does not enter or accumulate.

32.5.4. ~~(d)~~ Transformers.

32.5.4.a. ~~(1)~~ Energized transformers and other related electrically energized equipment over one hundred fifty (150) volts to ground shall be protected so as to prevent accidental contact with any person. Protection shall be provided by individual integrated housing or by an enclosure, such as an electrical substation fence, which accommodates a group of such equipment. Metallic enclosures shall

be grounded.

32.5.4.b. ~~(2)~~ Access to energized equipment covered by ~~subparagraph (1) of this paragraph~~ Subdivision 32.5.4.a. shall be secured by lock or other fasteners requiring the use of tools to open them.

32.5.4.c. ~~(3)~~ Signs indicating danger and prohibiting unauthorized access shall be conspicuously displayed on the housing or other enclosure around the equipment.

32.5.4.d. ~~(4)~~ Transformers mounted on utility poles at a height of more than twelve (12) feet from the ground are exempt from the requirements of this ~~paragraph~~ Subsection.

32.5.5. ~~(e)~~ Welding and cutting equipment. Welding and cutting equipment shall meet the requirements specified in ~~Sections 20 and 31 of these regulations~~ §36-23-31.

32.6. ~~32.5:~~ Battery rooms and battery charging.

32.6.1. ~~(a)~~ General requirements.

32.6.1.a. ~~(1)~~ Batteries of the ~~nonseal~~ unsealed type shall be located in enclosures with outside vents or in well ventilated rooms, so arranged as to prevent the escape of fumes, gases, or electrolyte spray into other areas.

32.6.1.b. ~~(2)~~ Ventilation shall be provided to ensure diffusion to the gases from the battery to prevent the accumulation of an explosive mixture.

32.6.1.c. ~~(3)~~ Racks and trays shall be substantial and treated to be resistant to the electrolyte.

32.6.1.d. ~~(4)~~ Floors shall be of acid resistant construction or be protected from acid accumulations.

32.6.1.e. ~~(5)~~ Face shields, aprons, and rubber gloves shall be provided for ~~workmen~~ workers handling acids or batteries.

32.6.1.f. ~~(6)~~ Facilities for quick drenching of the eyes and body shall be provided within twenty-five (25) feet of the work area for emergency use.

32.6.1.g. ~~(7)~~ Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries.

32.6.2. ~~(b)~~ Charging.

32.6.2.a. ~~(1)~~ Battery charging installations shall be located in areas designated for that purpose.

32.6.2.b. ~~(2)~~ When charging batteries, the vent caps shall be kept in place to avoid electrolyte spray. Care shall be taken to assure that vent caps are functioning.

32.7. ~~32.6:~~ Hazardous locations.

32.7.1. ~~(a)~~ General. For the purpose of this Section, hazardous locations are defined as follows:

32.7.1.a. ~~(1)~~ Class 1 Locations: Class 1 Locations are those in which flammable gases or vapors are or may be present in quantities sufficient to produce explosive or ignitable mixtures.

32.7.1.b. ~~(2)~~ Class 2 Locations: Class 2 Locations are those which are hazardous because of the presence of combustible dust.

32.7.1.c. ~~(3)~~ Class 3 Locations: Class 3 Locations are those which are hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in air in quantities sufficient to produce ignitable mixtures.

32.7.1.d. ~~(4)~~ See the National Electrical Code, NFPA 70-1971; ANSI CI-1971 (Rev. of CI-1968) for further definitions of Divisions 1 and 2 for each class.

32.7.2. ~~(b)~~ All components and utilization equipment used in a hazardous location shall be chosen from among those listed by a nationally recognized testing laboratory, such as Underwriters Laboratories, Inc., or Factory Mutual Engineering Corporation, except custom-made components and utilization equipment.

32.7.3. ~~(c)~~ Equipment approved for a specific hazardous location shall not be installed or intermixed with equipment approved for another specific hazardous location.

32.7.4. ~~(d)~~ The employer ~~Employer~~ shall ensure that all wiring components and utilization equipment are maintained as vapor, dust, or fiber tight as contemplated by their approvals. There shall be no loose or missing screws, gaskets, threaded connections, or other impairments to this tight condition.

32.8. ~~32.7.~~ Definitions applicable to ~~this subpart~~ Sections 36-23-32.1. through 36-23-32.7.

32.8.1. ~~(a)~~ The definition of "Approved" as set forth in ~~this~~ these Sections shall apply.

32.8.2. ~~(b)~~ "Bonding jumper" shall mean a conductor to assure the required electrical conductivity between metal parts required to be electrically connected.

32.8.3. ~~(c)~~ "Branch circuits" shall mean that portion of a wiring system extending beyond the final overcurrent device protecting the circuit. (A device not approved for branch circuit protection, such as thermal cutout or motor overload protective device, is not considered as the overcurrent device protecting the circuit.)

32.8.4. ~~(d)~~ "Circuit breaker" shall mean a device designed to open and close a circuit by manual means, ~~an~~ and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating.

32.8.5. ~~(e)~~ "Exposed" (as applied to live parts) shall mean that a live part can be inadvertently touched or approached nearer than a safe distance by a person. This term applies to parts not suitably guarded, isolated, or insulated.

32.8.6. ~~(f)~~ "Ground" shall mean a conducting connection, whether intentional or accidental, between an electrical circuit or equipment and earth, or to some conducting body which serves in place

of the earth.

32.8.7. (g) "Grounded" shall mean connected to earth or to some conducting body which serves in place of the earth.

32.8.8. (h) "Hazard" shall ~~is considered to~~ include casualty, fire, and shock when applicable.

32.8.9. (i) "Isolated" shall means not readily accessible to a person unless special means of access are used.

32.8.10. (j) "Raceway" shall mean any channel for loosely holding wires or cable in interior work which is designed expressly and used solely for this purpose. Raceways may be of metal, wood, or insulating material, and the term includes wood and metal moldings consisting of a backing and capping, and also metal ducts into which wires are to be pulled.

32.8.11. (k) "Shock hazard" shall mean considered to exist at an accessible part in a circuit between the part and ground, or other accessible parts if the potential is more than forty-two and four tenths (42.4) volts peak and the current through a one thousand five hundred (1,500)-ohm load is more than five (5) milliamperes.

32.8.12. (l) "Weatherproof" shall mean so constructed or protected that exposure to the weather shall not interfere with successful operation.

### **§36-23-33. Stairways, Ladders and Scaffolding.**

#### 33.1. Stairways and ladders.

##### 33.1.1. Definitions.

33.1.1.a. "Cleat" shall mean a ladder crosspiece of rectangular cross section placed on edge upon which a person may step while ascending or descending a ladder.

33.1.1.b. "Double-cleat ladder" shall mean a ladder similar in construction to a single-cleat ladder, but with a center rail to allow simultaneous two-way traffic for employees ascending or descending.

33.1.1.c. "Equivalent" shall mean alternative designs, materials, or methods that the employer can demonstrate will provide an equal or greater degree of safety for employees than the method or item specified in the standard.

33.1.1.d. "Extension trestle ladder" shall mean a self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable extension section, with a suitable means for locking the ladders together.

33.1.1.e. "Failure" shall mean load refusal, breakage or separation of component parts. Load refusal is the point where the structural members lose their ability to carry the loads.

33.1.1.f. "Fixed-ladder" shall mean a ladder that cannot be readily moved or carried because it is an integral part of a building or structure. A side-step fixed ladder is a fixed ladder that requires a person getting off at the top to step to the side of the ladder side rails to reach the landing. A

through fixed ladder is a fixed ladder that requires a person getting off at the top to step between the side rails of the ladder to reach the landing.

33.1.1.g. "Handrail" shall mean a rail used to provide employees with a handhold for support.

33.1.1.h. "Individual-rung/step ladders" shall mean ladders without a side rail or center rail support. Such ladders are made by mounting individual steps or rungs directly to the side or wall of the structure.

33.1.1.i. "Job-made ladder" shall mean a ladder that is fabricated by employees, typically at the construction site, and is not commercially manufactured. This definition does not apply to any individual-rung/step ladders.

33.1.1.j. "Ladder stand" shall mean a mobile fixed size self-supporting ladder consisting of a wide flat tread ladder in the form of stairs. The assembly may include handrails.

33.1.1.k. "Lower levels" shall mean those areas to which an employee can fall from a stairway or ladder. Such areas include ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, material, water, equipment, and similar surfaces. It does not include the surface from which the employee falls.

33.1.1.l. "Maximum intended load" shall mean the total load of all employees, equipment, tools, materials, transmitted loads, and other loads anticipated to be applied to a ladder component at any one time.

33.1.1.m. "Nosing" shall mean that portion of a tread projecting beyond the face of the riser immediately below.

33.1.1.n. "Point of access" shall mean all areas used by employees for work related passage from one area or level to another. Such open areas include doorways, passageways, stairway openings, studded walls, and various other permanent or temporary openings used for such travel.

33.1.1.o. "Portable ladder" shall mean a ladder that can be readily moved or carried.

33.1.1.p. "Riser height" shall mean the vertical distance from the top of a tread to the top of the next higher tread or platform/landing or the distance from the top of a platform/landing to the top of the next higher tread or platform/landing.

33.1.1.q. "Side-step fixed ladder." See "Fixed ladder."

33.1.1.r. "Single-cleat ladder" shall mean a ladder consisting of a pair of side rails, connected together by cleats, rungs, or steps.

33.1.1.s. "Single-rail ladder" shall mean a portable ladder with rungs, cleats, or steps mounted on a single rail instead of the normal two rails used on most other ladders.

33.1.1.t. "Spiral stairway" shall mean a series of steps attached to a vertical pole and progressing upward in a winding fashion within a cylindrical space.

33.1.1.u. "Stairrail system" shall mean a vertical barrier erected along the unprotected sides and edges of a stairway to prevent employees from falling to lower levels. The top surface of a stairrail system may also be a "handrail."

33.1.1.v. "Step stool" ("ladder type") shall mean a self-supporting, foldable, portable ladder, nonadjustable in length, 32 inches or less in overall size, with flat steps and without a pail shelf, designed to be climbed on the ladder top cap as well as all steps. The side rails may continue above the top cap.

33.1.1.w. "Through fixed ladder." See "Fixed ladder."

33.1.1.x. "Tread depth" shall mean the horizontal distance from front to back of a tread (excluding nosing, if any).

33.1.1.y. "Unprotected sides and edges" shall mean any side or edge (except at entrances to points of access) of a stairway where there is no stairrail system or wall thirty-six (36) inches or more in height, and any side or edge (except at entrances to points of access) of a stairway landing, or ladder platform where there is no wall or guardrail system thirty-nine (39) inches or more in height.

#### 33.1.2. Training requirements -- stairways and ladders.

33.1.2.a. The employer shall provide a training program for each employee using ladders and stairways, as necessary. The program shall enable each employee to recognize hazards related to ladders and stairways, and shall train each employee in the procedures to be followed to minimize these hazards.

33.1.2.b. The employer shall ensure that each employee has been trained by a competent person in the following areas, as applicable:

33.1.2.b.1. The nature of fall hazards in the work area;

33.1.2.b.2. The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used;

33.1.2.b.3. The proper construction, use, placement, and care in handling of all stairways and ladders;

33.1.2.b.4. The maximum intended load-carrying capacities of ladders and

33.1.2.b.5. The standards contained in this Subsection.

33.1.2.c. Retraining shall be provided for each employee as necessary so that the employee maintains the understanding and knowledge acquired through compliance with this Subsection.

#### 33.1.3. General requirements -- stairways and ladders.

33.1.3.a. A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of nineteen (19) inches or more, and no ramp, runway, sloped embankment, or personnel hoist is provided.

33.1.3.a.1. Employees shall not use any spiral stairways that will not be a permanent

part of the structure on which construction work is being performed.

33.1.3.a.2. A double-cleated ladder or two (2) or more separate ladders shall be provided when ladders are the only mean of access or exit from a working area for twenty-five (25) or more employees, or when a ladder is to serve simultaneous two-way traffic.

33.1.3.a.3. When a building or structure has only one point of access between levels, that point of access shall be kept clear to permit free passage of employees. When work must be performed or equipment must be used such that free passage at that point of access is restricted, a second point of access shall be provided and used.

33.1.3.a.4. When a building or structure has two or more points of access between levels, at least one point of access shall be kept clear to permit free passage of employees.

33.1.3.b. Employers shall provide and install all stairway and ladder fall protection systems required by this Section and shall comply with all other pertinent requirements of this Section before employees begin the work that necessitates the installation and use of stairways, ladders, and their respective fall protective systems.

#### 33.1.4. Stairways.

33.1.4.a. The following requirements apply to all stairways as indicated:

33.1.4.a.1. Stairways that will not be a permanent part of the structure on which construction work is being performed shall have landings of not less than thirty (30) inches in the direction of travel and extend at least twenty-two (22) inches in width at every twelve (12) feet or less of vertical rise.

33.1.4.a.2. Stairs shall be installed between thirty (30) degrees and fifty (50) degrees from horizontal.

33.1.4.a.3. Riser height and tread depth shall be uniform within each flight of stairs, including any foundation structure used as one (1) or more treads of the stairs. Variations in riser height or tread depth shall not be over one-fourth (1/4) inch in any stairway system.

33.1.4.a.4. Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than twenty (20) inches.

33.1.4.a.5. Metal pan landings and metal pan treads, when used, shall be secured in place before filling with concrete or other material.

33.1.4.a.6. All parts of stairways shall be free of hazardous projections, such as protruding nails.

33.1.4.a.7. Slippery conditions on stairways shall be eliminated before the stairways are used to reach other levels.

33.1.4.b. Temporary service. The following requirements apply to all stairways as indicated:

33.1.4.b.1. Except during stairway construction, foot traffic is prohibited on stairways with pan stairs where the treads and/or landings are to be filled in with concrete or other material at a later date, unless the stairs are temporarily fitted with wood or other solid material at least to the top edge of each pan. Such temporary treads and landings shall be replaced when worn below the level of the top edge of the pan.

33.1.4.b.2. Except during stairway construction, foot traffic is prohibited on skeleton metal stairs where permanent treads and/or landings are to be installed at a later date, unless the stairs are fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area.

33.1.4.b.3. Treads for temporary service shall be made of wood or other solid material, and shall be installed the full width and depth of the stair.

33.1.4.c. Stairrails and handrails. The following requirements apply to all stairways as indicated:

33.1.4.c.1. Stairways having four (4) or more risers or rising more than thirty (30) inches, whichever is less, shall be equipped with:

33.1.4.c.1.A. At least one (1) handrail; and

33.1.4.c.1.B. One (1) stairrail system along each unprotected side or edge.

33.1.4.c.1.C. Note: When the top edge of a stairrail system also serves as a handrail, Paragraph 33.1.3.c.7. applies.

33.1.4.c.2. Winding and spiral stairways shall be equipped with a handrail offset sufficiently to prevent walking on those portions of the stairways where the tread width is less than six (6) inches.

33.1.4.c.3. The height of stairrails installed after March 15, 1991, shall be not less than thirty-six (36) inches from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

33.1.4.c.4. Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members, shall be provided between the top rail of the stairrail system and the stairway steps.

33.1.4.c.4.A. Midrails, when used, shall be located at a height midway between the top edge of the stairrail system and the stairway steps.

33.1.4.c.4.B. Screens or mesh, when used, shall extend from the top rail to the stairway step, and along the entire opening between top rail supports.

33.1.4.c.4.C. When intermediate vertical members, such as balusters, are used between posts, they shall be not more than nineteen (19) inches apart.

33.1.4.c.4.D. Other structural members, when used, shall be installed such that there are no openings in the stairrail system that are more than nineteen (19) inches wide.

33.1.4.c.5. Handrails and the top rails of stairrail systems shall be capable of withstanding, without failure, a force of at least two hundred (200) pounds applied within two (2) inches of the top edge, in any downward or outward direction, at any point along the top edge.

33.1.4.c.6. The height of handrails shall be not more than thirty-seven (37) inches nor less than thirty (30) inches from the upper surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

33.1.4.c.7. When the top edge of a stairrail system also serves as a handrail, the height of the top edge shall be not more than thirty-seven (37) inches nor less than thirty-six (36) inches from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

33.1.4.c.8. Stairrail systems and handrails shall be so surfaced as to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

33.1.4.c.9. Handrails shall provide an adequate handhold for employees grasping them to avoid falling.

33.1.4.c.10. The ends of stairrail systems and handrails shall be constructed so as not to constitute a projection hazard.

33.1.4.c.11. Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of three (3) inches between the handrail and walls, stairrail systems, and other objects.

33.1.4.c.12. Unprotected sides and edges of stairway landings shall be provided with guardrail systems.

#### 33.1.5. Ladders.

33.1.5.a. General. The following requirements apply to all ladders as indicated, including job-made ladders.

33.1.5.a.1. Ladders shall be capable of supporting the following loads without failure:

33.1.5.a.1.A. Each self-supporting portable ladder: At least four (4) times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladder shall sustain at least three and three-tenths (3.3) times the maximum intended load. The ability of a ladder to sustain the loads indicated in this Subparagraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction. Ladders built and tested in conformance with the applicable provisions of OSHA §1926 Subpart X - Appendix A - Ladders will be deemed to meet this requirement.

33.1.5.a.1.B. Each portable ladder that is not self-supporting: At least four (4) times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladder shall sustain at least three and three-tenths (3.3) times the maximum intended load. The ability of a ladder to sustain the loads indicated in this Subparagraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction when the ladder is placed at an angle of seventy-five and one-half (75-1/2) degrees from the horizontal. Ladders built and tested in conformance

with the applicable provisions of OSHA §1926 Subpart X - Appendix A - Ladders will be deemed to meet this requirement.

33.1.5.a.1.C. Each fixed ladder: At least two (2) loads of two hundred fifty (250) pounds each, concentrated between any two (2) consecutive attachments (the number and position of additional concentrated loads of two hundred fifty (250) pounds each, determined from anticipated usage of the ladder, shall also be included), plus anticipated loads caused by ice buildup, winds, rigging, and impact loads resulting from the use of ladder safety devices. Each step or rung shall be capable of supporting a single concentrated load of at least two hundred fifty (250) pounds applied in the middle of the step or rung. Ladders built in conformance with the applicable provisions of OSHA §1926 Subpart X - Appendix A -- Ladders will be deemed to meet this requirement.

33.1.5.a.1.D. A ladder designed and built in accordance with the applicable national consensus standards, as set forth below, will be considered to meet the requirements of this Section.

33.1.5.a.1.D.1. Manufactured portable wood ladders: American National Standards Institute (ANSI) A14.1-1982 - American National Standard for Ladders - Portable Wood - Safety Requirements.

33.1.5.a.1.D.2. Manufactured portable metal ladders: ANSI A14.2-1982 - American National Standard for Ladders - Portable Metal - Safety Requirements.

33.1.5.a.1.D.3. Manufactured fixed ladders: ANSI A14.3-1984 - American National Standard for Ladders - Fixed - Safety Requirements.

33.1.5.a.1.D.4. Job-made ladders: ANSI A14.4-1979 - Safety Requirements for Job-Made Ladders.

33.1.5.a.1.D.5. Plastic ladders: ANSI A14.5-1982 - American National Standard for Ladders - Portable Reinforced Plastic - Safety Requirements.

33.1.5.a.2. Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced when the ladder is in position for use.

33.1.5.a.2.A. Rungs, cleats, and steps of portable ladders (except as provided below) and fixed ladders (including individual-rung/step ladders) shall be spaced not less than ten (10) inches apart, nor more than fourteen (14) inches apart, as measured between center lines of the rungs, cleats, and steps.

33.1.5.a.2.B. Rungs, cleats, and steps of step stools shall be not less than eight (8) inches apart, nor more than twelve (12) inches apart, as measured between center lines of the rungs, cleats, and steps.

33.1.5.a.2.C. Rungs, cleats, and steps of the base section of extension trestle ladders shall not be less than eight (8) inches nor more than eighteen (18) inches apart, as measured between center lines of the rungs, cleats, and steps. The rung spacing on the extension section of the extension trestle ladder shall be not less than six (6) inches nor more than twelve (12) inches, as measured between center lines of the rungs, cleats, and steps.

33.1.5.a.3. The minimum clear distance between the sides of individual-rung/step

ladders and the minimum clear distance between the side rails of other fixed ladders shall be sixteen (16) inches.

33.1.5.a.4. The minimum clear distance between side rails for all portable ladders shall be eleven and one-half (11-1/2) inches.

33.1.5.a.5. The rungs of individual-rung/step ladders shall be shaped such that employees feet cannot slide off the end of the rungs.

33.1.5.a.6. The rungs and steps of fixed metal ladders manufactured after March 15, 1991, shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.

33.1.5.a.7. The rungs and steps of portable metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.

33.1.5.a.8. Ladders shall not be tied or fastened together to provide longer sections unless they are specifically designed for such use.

33.1.5.a.9. A metal spreader or locking device shall be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used.

33.1.5.a.10. When splicing is required to obtain a given length of side rail, the resulting side rail must be at least equivalent in strength to a one-piece side rail made of the same material.

33.1.5.a.11. Except when portable ladders are used to gain access to fixed ladders (such as those on utility towers, billboards, and other structures where the bottom of the fixed ladder is elevated to limit access), when two (2) or more separate ladders are used to reach an elevated work area, the ladders shall be offset with a platform or landing between the ladders.

33.1.5.a.12. Ladder components shall be surfaced so as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

33.1.5.a.13. Wood ladders shall not be coated with any opaque covering, except for identification or warning labels which may be placed on one face only of a side rail.

33.1.5.a.14. The minimum perpendicular clearance between fixed ladder rungs, cleats, and steps, and any obstruction behind the ladder shall be seven (7) inches, except in the case of an elevator pit ladder, for which a minimum perpendicular clearance of four and one-half (4-1/2) inches is required.

33.1.5.a.15. The minimum perpendicular clearance between the center line of fixed ladder rungs, cleats, and steps, and any obstruction on the climbing side of the ladder shall be thirty (30) inches, except as provided in Paragraph 33.1.5.a.16.

33.1.5.a.16. When unavoidable obstructions are encountered, the minimum perpendicular clearance between the centerline of fixed ladder rungs, cleats, and steps, and the obstruction on the climbing side of the ladder may be reduced to twenty-four (24) inches, provided that a deflection device is installed to guide employees around the obstruction.

33.1.5.a.17. Through fixed ladders at their point of access/egress shall have a step-across distance of not less than seven (7) inches nor more than twelve (12) inches as measured from the centerline of the steps or rungs to the nearest edge of the landing area. If the normal step-across distance exceeds twelve (12) inches, a landing platform shall be provided to reduce the distance to the specified limit.

33.1.5.a.18. Fixed ladders without cages or wells shall have a clear width to the nearest permanent object of at least fifteen (15) inches on each side of the centerline of the ladder.

33.1.5.a.19. Fixed ladders shall be provided with cages, wells, ladder safety devices, or self-retracting lifelines where the length of climb is less than twenty-four (24) feet but the top of the ladder is at a distance greater than twenty-four (24) feet above lower levels.

33.1.5.a.20. Where the total length of a climb equals or exceeds twenty-four (24) feet, fixed ladders shall be equipped with one (1) of the following:

33.1.5.a.20.A. Ladder safety devices; or

33.1.5.a.20.B. Self-retracting lifelines, and rest platforms at intervals not to exceed one hundred fifty (150) feet; or

33.1.5.a.20.C. A cage or well, and multiple ladder sections, each ladder section not to exceed fifty (50) feet in length. Ladder sections shall be offset from adjacent sections, and landing platforms shall be provided at maximum intervals of fifty (50) feet.

33.1.5.a.21. Cages for fixed ladders shall conform to all of the following:

33.1.5.a.21.A. Horizontal bands shall be fastened to the side rails of rail ladders, or directly to the structure, building, or equipment for individual-rung ladders;

33.1.5.a.21.B. Vertical bars shall be on the inside of the horizontal bands and shall be fastened to them;

33.1.5.a.21.C. Cages shall extend not less than twenty-seven (27) inches, or more than thirty (30) inches from the centerline of the step or rung (excluding the flare at the bottom of the cage), and shall not be less than twenty-seven (27) inches in width;

33.1.5.a.21.D. The inside of the cage shall be clear of projections;

33.1.5.a.21.E. Horizontal bands shall be spaced not more than four (4) feet on center vertically;

33.1.5.a.21.F. Vertical bars shall be spaced at intervals not more than nine and one-half (9-1/2) inches on center horizontally;

33.1.5.a.21.G. The bottom of the cage shall be at a level not less than seven(7) feet nor more than eight (8) feet above the point of access to the bottom of the ladder. The bottom of the cage shall be flared not less than four (4) inches all around within the distance between the bottom horizontal band and the next higher band;

33.1.5.a.21.H. The top of the cage shall be a minimum of forty-two (42) inches above the top of the platform, or the point of access at the top of the ladder, with provision for access to the platform or other point of access.

33.1.5.a.22. Wells for fixed ladders shall conform to all of the following:

33.1.5.a.22.A. They shall completely encircle the ladder;

33.1.5.a.22.B. They shall be free of projections;

33.1.5.a.22.C. Their inside face on the climbing side of the ladder shall extend not less than twenty-seven (27) inches nor more than thirty (30) inches from the centerline of the step or rung;

33.1.5.a.22.D. The inside clear width shall be at least thirty (30) inches;

33.1.5.a.22.E. The bottom of the wall on the access side shall start at a level not less than seven (7) feet nor more than eight (8) feet above the point of access to the bottom of the ladder.

33.1.5.a.23. Ladder safety devices, and related support systems, for fixed ladders shall conform to all of the following:

33.1.5.a.23.A. They shall be capable of withstanding without failure a drop test consisting of an eighteen (18) inch drop of a five hundred (500) pound weight;

33.1.5.a.23.B. They shall permit the employee using the device to ascend or descend without continually having to hold, push or pull any part of the device, leaving both hands free for climbing;

33.1.5.a.23.C. They shall be activated within two (2) feet after a fall occurs, and limit the descending velocity of an employee to seven (7) feet/sec. or less;

33.1.5.a.23.D. The connection between the carrier or lifeline and the point of attachment to the harness shall not exceed nine (9) inches in length.

33.1.5.a.24. The mounting of ladder safety devices for fixed ladders shall conform to the following:

33.1.5.a.24.A. Mountings for rigid carriers shall be attached at each end of the carrier, with intermediate mountings, as necessary, spaced along the entire length of the carrier, to provide the strength necessary to stop employees falls.

33.1.5.a.24.B. Mountings for flexible carriers shall be attached at each end of the carrier. When the system is exposed to wind, cable guides for flexible carriers shall be installed at a minimum spacing of twenty-five (25) feet and maximum spacing of forty (40) feet along the entire length of the carrier, to prevent wind damage to the system.

33.1.5.a.24.C. The design and installation of mountings and cable guides shall not reduce the design strength of the ladder.

33.1.5.a.25. The side rails of through or side-step fixed ladders shall extend forty-two (42) inches above the top of the access level or landing platform served by the ladder. For a parapet ladder, the access level shall be the roof if the parapet is cut to permit passage through the parapet; if the parapet is continuous, the access level shall be the top of the parapet.

33.1.5.a.26. For through-fixed-ladder extensions, the steps or rungs shall be omitted from the extension and the extension of the side rails shall be flared to provide not less than twenty-four (24) inches nor more than thirty (30) inches clearance between side rails. Where ladder safety devices are provided, the maximum clearance between side rails of the extensions shall not exceed thirty-six (36) inches.

33.1.5.a.27. For side-step fixed ladders, the side rails and the steps or rungs shall be continuous in the extension.

33.1.5.a.28. Individual-rung/step ladders, except those used where their access openings are covered with manhole covers or hatches, shall extend at least forty-two (42) inches above an access level or landing platform either by the continuation of the rung spacings as horizontal grab bars or by providing vertical grab bars that shall have the same lateral spacing as the vertical legs of the rungs.

33.1.5.b. Use. The following requirements apply to the use of all ladders, including job-made ladders, except as otherwise indicated:

33.1.5.b.1. When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least three (3) feet above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladders length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

33.1.5.b.2. Ladders shall be maintained free of oil, grease, and other slipping hazards.

33.1.5.b.3. Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

33.1.5.b.4. Ladders shall be used only for the purpose for which they were designed.

33.1.5.b.5. Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter (1/4) of the working length of the ladder (the distance along the ladder between the foot and the top support).

33.1.5.b.5.A. Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth (1/8) the working length of the ladder.

33.1.5.b.5.B. Fixed ladders shall be used at a pitch no greater than ninety (90) degrees from the horizontal, as measured to the back side of the ladder.

33.1.5.b.6. Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.

33.1.5.b.7. Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.

33.1.5.b.8. Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.

33.1.5.b.9. The area around the top and bottom of ladders shall be kept clear.

33.1.5.b.10. The top of a non-self-supporting ladder shall be placed with the two (2) rails supported equally unless it is equipped with a single support attachment.

33.1.5.b.11. Ladders shall not be moved, shifted, or extended while occupied.

33.1.5.b.12. Ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized electrical equipment.

33.1.5.b.13. The top or top step of a stepladder shall not be used as a step.

33.1.5.b.14. Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.

33.1.5.b.15. Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.

33.1.5.b.16. Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service until repaired.

33.1.5.b.17. Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either:

33.1.5.b.17.A. Immediately tagged with "Do Not Use" or similar language,

33.1.5.b.17.B. Marked in a manner that readily identifies it as defective;

33.1.5.b.17.C. Or blocked (such as with a plywood attachment that spans several rungs).

33.1.5.b.18. Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.

33.1.5.b.19. Single-rail ladders shall not be used.

33.1.5.b.20. When ascending or descending a ladder, the user shall face the ladder.

33.1.5.b.21. Each employee shall use at least one (1) hand to grasp the ladder when progressing up and/or down the ladder.

33.1.5.b.22. An employee shall not carry any object or load that could cause the employee to lose balance and fall.

### 33.2. Scaffolding.

#### 33.2.1. Definitions -- scaffolding.

33.2.1.a. "Adjustable suspension scaffold" shall mean a suspension scaffold equipped with a hoist(s) that can be operated by an employee(s) on the scaffold.

33.2.1.b. "Bearer" shall mean a horizontal transverse scaffold member (which may be supported by ledgers or runners) upon which the scaffold platform rests and which joins scaffold uprights, posts, poles, and similar members.

33.2.1.c. "Boatswain's chair" shall mean a single-point adjustable suspension scaffold consisting of a seat or sling designed to support one (1) employee in a sitting position.

33.2.1.d. "Body belt" ("safety belt") shall mean a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

33.2.1.e. "Body harness" shall mean a design of straps which may be secured about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders, with means for attaching it to other components of a personal fall arrest system.

33.2.1.f. "Brace" shall mean a rigid connection that holds one (1) scaffold member in a fixed position with respect to another member, or to a building or structure.

33.2.1.g. "Bricklayers' square scaffold" shall mean a supported scaffold composed of framed squares which support a platform.

33.2.1.h. "Carpenters' bracket scaffold" shall mean a supported scaffold composed of framed squares which support a platform.

33.2.1.i. "Catenary scaffold" shall mean a suspension scaffold consisting of a platform supported by two (2) essentially horizontal and parallel ropes attached to structural members of a building or other structure. Additional support may be provided by vertical pickups.

33.2.1.j. "Chimney hoist" shall mean a multi-point adjustable suspension scaffold used to provide access to work inside chimneys. (See multi-point adjustable "suspension scaffold.")

33.2.1.k. "Cleat" shall mean a structural block used at the end of a platform to prevent the platform from slipping off its supports. Cleats are also used to provide footing on sloped surfaces such as crawling boards.

33.2.1.l. "Competent person" shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

33.2.1.m. "Continuous run scaffold" ("run scaffold") shall mean a two-point or multi-point adjustable suspension scaffold constructed using a series of interconnected braced scaffold members or supporting structures erected to form a continuous scaffold.

33.2.1.n. "Coupler" shall mean a device for locking together the tubes of a tube and coupler scaffold.

33.2.1.o. "Crawling board" ("chicken ladder") shall mean a supported scaffold consisting of a plank with cleats spaced and secured to provide footing, for use on sloped surfaces such as roofs.

33.2.1.p. "Deceleration device" shall mean any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyard, or automatic self-retracting lifeline lanyard, which dissipates a substantial amount of energy during a fall arrest or limits the energy imposed on an employee during fall arrest.

33.2.1.q. "Double pole ("independent pole") scaffold" shall mean a supported scaffold consisting of a platform(s) resting on cross beams (bearers) supported by ledgers and a double row of uprights independent of support (except ties, guys, braces) from any structure.

33.2.1.r. "Equivalent" shall mean alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials, or designs specified in the standard.

33.2.1.s. "Exposed power lines" shall mean electrical power lines which are accessible to employees and which are not shielded from contact. Such lines do not include extension cords or power tool cords.

33.2.1.t. "Eye" or "Eye splice" shall mean a loop with or without a thimble at the end of a wire rope.

33.2.1.u. "Fabricated decking and planking" shall mean manufactured platforms made of wood (including laminated wood and solid sawn wood planks), metal or other materials.

33.2.1.v. "Fabricated frame scaffold" ("tubular welded frame scaffold frame scaffold") shall mean a scaffold consisting of a platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

33.2.1.w. "Failure" shall mean load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

33.2.1.x. "Float ("ship") scaffold" shall mean a suspension scaffold consisting of a braced platform resting on two (2) parallel bearers and hung from overhead supports by ropes of fixed length.

33.2.1.y. "Form scaffold" shall mean a supported scaffold consisting of a platform supported by brackets attached to formwork.

33.2.1.z. "Guardrail system" shall mean a vertical barrier, consisting of, but not limited to, toprails, midrails, and posts, erected to prevent employees from falling off a scaffold platform or walkway to lower levels.

33.2.1.aa. "Hoist" shall mean a manual or power-operated mechanical device to raise or lower a suspended scaffold.

33.2.1.bb. "Horse scaffold" shall mean a supported scaffold consisting of a platform supported by construction horses (saw horses). Horse scaffolds constructed of wood or metal are sometimes known as trestle scaffolds.

33.2.1.cc. "Independent pole scaffold". (See "double pole scaffold.")

33.2.1.dd. "Interior hung scaffold" shall mean a suspension scaffold consisting of a platform suspended from the ceiling or roof structure by fixed length supports.

33.2.1.ee. "Ladder jack scaffold" shall mean a supported scaffold consisting of a platform resting on brackets attached to ladders.

33.2.1.ff. "Ladder stand" shall mean a mobile fixed-size, self-supporting ladder consisting of a wide flat tread ladder in the form of stairs.

33.2.1.gg. "Landing" shall mean a platform at the end of a flight of stairs.

33.2.1.hh. "Large area scaffold" shall mean a pole scaffold, tube and coupler scaffold, systems scaffold, or fabricated frame scaffold erected over substantially the entire work area. For example, a scaffold erected over the entire floor area of a room.

33.2.1.ii. "Lean-to scaffold" shall mean a supported scaffold which is kept erect by tilting it toward and resting it against a building or structure.

33.2.1.jj. "Lifeline" shall mean a component consisting of a flexible line that connects to an anchorage at one end of hang vertically (vertical lifeline), or that connects to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

33.2.1.kk. "Lower levels" shall mean areas below the level where the employee is located and to which an employee can fall. Such areas include, but are not limited to, ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, materials, water and equipment.

33.2.1.ll. "Masons' adjustable supported scaffold." (See "self-contained adjustable scaffold.")

33.2.1.mm. "Masons' multi-point adjustable suspension scaffold" shall mean a continuous run suspension scaffold designed and used for masonry operations.

33.2.1.nn. "Maximum intended load" shall mean the total load of all persons, equipment, tools, materials, transmitted loads, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

33.2.1.oo. "Mobile scaffold" shall mean a powered or unpowered, portable, caster or wheel-mounted supported scaffold.

33.2.1.pp. "Multi-level suspended scaffold" shall mean a two-point or multi-point adjustable suspension scaffold with a series of platforms at various levels resting on common stirrups.

33.2.1.qq. "Multi-point adjustable suspension scaffold" shall mean a suspension scaffold consisting of a platform(s) which is suspended by more than two (2) ropes from overhead supports and equipped with means to raise and lower the platform to desired work levels. Such scaffolds include chimney hoists.

33.2.1.rr. "Needle beam scaffold" shall mean a platform suspended from needle beams.

33.2.1.ss. "Open sides and ends" shall mean the edges of a platform that are more than fourteen (14) inches away horizontally from a sturdy, continuous, vertical surface (such as a building wall) or a sturdy, continuous horizontal surface (such as a floor), or a point of access. Exception: For plastering and lathing operations, the horizontal threshold distance is eighteen (18) inches.

33.2.1.tt. "Outrigger" shall mean the structural member of a supported scaffold used to increase the base width of a scaffold in order to provide support for and increased stability of the scaffold.

33.2.1.uu. "Outrigger beam" ("thrustout") shall mean the structural member of a suspension scaffold or outrigger scaffold which provides support for the scaffold by extending the scaffold point of attachment to a point out and away from the structure or building.

33.2.1.vv. "Outrigger scaffold" shall mean a supported scaffold consisting of a platform resting on outrigger beams (thrustouts) projecting beyond the wall or face of the building or structure, the inboard ends of which are secured inside the building or structure.

33.2.1.wv. "Overhand bricklaying" shall mean the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. It includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

33.2.1.xx. "Personal fall arrest system" shall mean a system used to arrest an employee's fall. It consists of an anchorage, connectors, and body harness and may include a lanyard, deceleration device, lifeline, or combinations of these.

33.2.1.yy. "Platform" shall mean a work surface elevated above lower levels. Platforms can be constructed using individual wood planks, fabricated planks, fabricated decks, and fabricated platforms.

33.2.1.zz. "Pole scaffold". (See definitions for "single pole scaffold" and "double ("independent") pole scaffold").

33.2.1.aaa. "Power operated hoist" shall mean a hoist which is powered by other than human energy.

33.2.1.bbb. "Pump jack scaffold" shall mean a supported scaffold consisting of a platform

supported by vertical poles and movable support brackets.

33.2.1.ccc. "Qualified" shall mean one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

33.2.1.ddd. "Rated load" shall mean the manufacturer's specified maximum load to be lifted by a hoist or to be applied to a scaffold or scaffold component.

33.2.1.eee. "Repair bracket scaffold" shall mean a supported scaffold consisting of a platform supported by brackets which are secured in place around the circumference or perimeter of a chimney, stack, tank or other supporting structure by one (1) or more wire ropes placed around the supporting structure.

33.2.1.fff. "Roof bracket scaffold" shall mean a rooftop supported scaffold consisting of a platform resting on angular-shaped supports.

33.2.1.ggg. "Runner" ("ledger or ribbon") shall mean the lengthwise horizontal spacing or bracing member which may support the bearers.

33.2.1.hhh. "Scaffold" shall mean any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage) used for supporting employees or materials or both.

33.2.1.iii. "Self-contained adjustable scaffold" shall mean a combination supported and suspension scaffold consisting of an adjustable platform(s) mounted on an independent supporting frame(s) not a part of the object being worked on, and which is equipped with a means to permit the raising and lowering of the platform(s). Such systems include rolling roof rigs, rolling outrigger systems, and some masons' adjustable supported scaffolds.

33.2.1.jjj. "Shore scaffold" shall mean a supported scaffold which is placed against a building or structure and held in place with props.

33.2.1.kkk. "Single-point adjustable suspension scaffold" shall mean a suspension scaffold consisting of a platform suspended by one (1) rope from an overhead support and equipped with means to permit the movement of the platform to desired work levels.

33.2.1.III. "Single pole scaffold" shall mean a supported scaffold consisting of a platform(s) resting on bearers, the outside ends of which are supported on runners secured to a single row of posts or uprights, and the inner ends of which are supported on or in a structure or building wall.

33.2.1.mmm. "Stair tower" ("scaffold stairway/tower") shall mean a tower comprised of scaffold components and which contains internal stairway units and rest platforms. These towers are used to provide access to scaffold platforms and other elevated points such as floors and roofs.

33.2.1.nnn. "Stall" shall mean the load at which the prime-mover of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected.

33.2.1.ooo. "Step, platform, and trestle ladder scaffold" shall mean a platform resting

directly on the rungs of step ladders or trestle ladders.

33.2.1.ppp. "Stilts" shall mean a pair of poles or similar supports with raised footrests used to permit walking above the ground or working surface.

33.2.1.qqq. "Stonesetters' multi-point adjustable suspension scaffold" shall mean a continuous run suspension scaffold designed and used for stonesetters' operations.

33.2.1.rrr. "Supported scaffold" shall mean one (1) or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

33.2.1.sss. "Suspension scaffold" shall mean one (1) or more platforms suspended by ropes or other non-rigid means from an overhead structure.

33.2.1.ttt. "System scaffold" shall mean one (1) or more platforms suspended by ropes or other non-rigid means from an overhead structure(s).

33.2.1.uuu. "Tank builders' scaffold" shall mean a supported scaffold consisting of a platform resting on brackets that are either directly attached to a cylindrical tank or attached to devices that are attached to such a tank.

33.2.1.vvv. "Top plate bracket scaffold" shall mean a scaffold supported by brackets that hook over or are attached to the top of a wall. This type of scaffold is similar to carpenter's bracket scaffolds and form scaffolds and is used in residential construction for setting trusses.

33.2.1.www. "Tube and coupler scaffold" shall mean a supported or suspended scaffold consisting of a platform(s) supported by tubing, elected with coupling devices connecting uprights, braces, bearers, and runners.

33.2.1.xxx. "Tubular welded frame scaffold". (See "Fabricated frame scaffold" -- Subdivision 33.2.1.v.)

33.2.1.yyy. "Two-point suspension scaffold" ("swing stage") shall mean a suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two (2) ropes from overhead supports and equipped with means to permit the raising and lowering of the platform to desired work levels.

33.2.1.zzz. "Unstable objects" shall mean items whose strength, configuration, or lack of stability may allow them to become dislocated and shift and therefore may not properly support the loads imposed on them. Unstable objects do not constitute a safe base support for scaffolds, platforms, or employees. Examples include, but are not limited to, barrels, boxes, loose brick, and concrete blocks.

33.2.1.aaaa. "Vertical pickup" shall mean a rope used to support the horizontal rope in catenary scaffolds.

33.2.1.bbbb. "Walkway" shall mean a portion of a scaffold platform used only for access and not as a work level.

33.2.1.cccc. "Window jack scaffold" shall mean a platform resting on a bracket or jack which projects through a window opening.

33.2.2. Training requirements -- scaffolding.

33.2.2.a. The employer shall have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training shall include the following areas, as applicable:

33.2.2.a.1. The nature of any electrical hazards, fall hazards and falling object hazards in the work area;

33.2.2.a.2. The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used;

33.2.2.a.3. The proper use of the scaffold, and the proper handling of materials on the scaffold;

33.2.2.a.4. The maximum intended load and the load-carrying capacities of the scaffolds used; and

33.2.2.a.5. Any other pertinent requirements of Subsections 33.2.3. through 33.2.26.

33.2.2.b. The employer shall have each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person to recognize any hazards associated with the work in question. The training shall include the following topics, as applicable:

33.2.2.b.1. The nature of scaffold hazards;

33.2.2.b.2. The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question;

33.2.2.b.3. The design criteria, maximum intended load-carrying capacity and intended use of the scaffold;

33.2.2.b.4. Any other pertinent requirements of Subsections 33.2.3. through 33.2.26.

33.2.2.c. When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer shall retrain each such employee so that the requisite proficiency is regained. Retraining is required in at least the following situations:

33.2.2.c.1. Where changes at the worksite present a hazard about which an employee has not been previously trained; or

33.2.2.c.2. Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or

33.2.2.c.3. Where inadequacies in an affected employee's work involving scaffolds

indicate that the employee has not retained the requisite proficiency.

33.2.2.d. A record of the training required in this Section shall be made on a MSHA 5000-23 form and be made available to an authorized representative of the Director or interested persons.

33.2.3. General requirements -- scaffolding.

33.2.3. a. Capacity.

33.2.3.a.1. Except as provided in Paragraphs 33.2.3.a.2., 33.2.3.a.3., 33.2.3.a.4., 33.2.3.a.5.m and Subdivision 33.2.3.gg. (fall protection), each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least four (4) times the maximum intended load applied or transmitted to it.

33.2.3.a.2. Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least four (4) times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

33.2.3.a.3. Each suspension rope, including connecting hardware, used on non-adjustable suspension scaffolds shall be capable of supporting, without failure, at least six (6) times the maximum intended load applied or transmitted to that rope.

33.2.3.a.4. Each suspension rope, including connecting hardware, used on adjustable suspension scaffolds shall be capable of supporting, without failure, at least six (6) times the maximum intended load applied or transmitted to that rope with the scaffold operating at either the rated load of the hoist, or two (2) (minimum) times the stall load of the hoist, whichever is greater.

33.2.3.a.5. The stall load of any scaffold hoist shall not exceed three (3) times its rated load.

33.2.3.a.6. Scaffolds shall be designed by a qualified person and shall be constructed and loaded in accordance with that design. Refer to non-mandatory Appendix A for Subpart L of OSHA §1926 for examples of criteria that will enable an employer to comply with Subdivision 33.2.3.a.

33.2.3.b. Scaffold platform construction.

33.2.3.b.1. Each platform on all working levels of scaffolds shall be fully planked or decked between the front uprights and the guardrail supports as follows:

33.2.3.b.1.A. Each platform unit (e.g., scaffold plank, fabricated plank, fabricated deck, or fabricated platform) shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than one (1) inch wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).

33.2.3.b.1.B. Where the employer makes the demonstration provided for in Subparagraph 33.2.3.b.1.A., the platform shall be planked or decked as fully as possible and the remaining open space between the platform and the uprights shall not exceed nine and one-half (9-1/2) inches.

33.2.3.b.1.C. Exception to Paragraph 33.2.3.b.1.: The requirement in Paragraph 33.2.3.b.1. to provide full planking or decking does not apply to platforms used solely as walkways or solely by employees performing scaffold erection or dismantling. In these situations, only the planking that the employer establishes is necessary to provide safe working conditions is required.

33.2.3.b.2. Except as provided in Paragraphs 33.2.3.b.2.A. and 33.2.3.b.2.B., each scaffold platform and walkway shall be at least eighteen (18) inches wide.

33.2.3.b.2.A. Each ladder jack scaffold, top plate bracket scaffold, roof bracket scaffold, and pump jack scaffold shall be at least twelve (12) inches wide. There is no minimum width requirement for boatswains' chairs.

33.2.3.b.2.B. Where scaffolds must be used in areas that the employer can demonstrate are so narrow that platforms and walkways cannot be at least eighteen (18) inches wide, such platforms and walkways shall be as wide as feasible, and employees on those platforms and walkways shall be protected from fall hazards by the use of guardrails and/or personal fall arrest systems.

33.2.3.b.3. Except as provided in Subparagraphs 33.2.3.b.3.A. and 33.2.3.b.3.B., the front edge of all platforms shall not be more than fourteen (14) inches from the face of the work, unless guardrail systems are erected along the front edge and/or personal fall arrest systems are used in accordance with Subdivision 33.2.3.gg. (fall protection) to protect employees from falling.

33.2.3.b.3.A. The maximum distance from the face for outrigger scaffolds shall be three (3) inches;

33.2.3.b.3.B. The maximum distance from the face for plastering and lathing operations shall be eighteen (18) inches.

33.2.3.b.4. Each end of a platform, unless cleated or otherwise restrained by hooks or equivalent means, shall extend over the centerline of its support at least six (6) inches.

#### 33.2.3.c. Platform length.

33.2.3.c.1. Each end of a platform ten (10) feet or less in length shall not extend over its support more than twelve (12) inches unless the platform is designed and installed so that the cantilevered portion of the platform is able to support employees and/or materials without tipping, or has guardrails which block employee access to the cantilevered end.

33.2.3.c.2. Each platform greater than ten (10) feet in length shall not extend over its support more than eighteen (18) inches, unless it is designed and installed so that the cantilevered portion of the platform is able to support employees without tipping, or has guardrails which block employee access to the cantilevered end.

33.2.3.c.3. On scaffolds where scaffold planks are abutted to create a long platform, each abutted end shall rest on a separate support surface. This provision does not preclude the use of common support members, such as "T" sections, to support abutting planks, or hook on platforms designed to rest on common supports.

33.2.3.c.4. On scaffolds where platforms are overlapped to create a long platform, the

overlap shall occur only over supports, and shall not be less than twelve (12) inches unless the platforms are nailed together or otherwise restrained to prevent movement.

33.2.3.c.5. At all points of a scaffold where the platform changes direction, such as turning a corner, any platform that rests on a bearer at an angle other than a right angle shall be laid first, and platforms which rest at right angles over the same bearer shall be laid second, on top of the first platform.

33.2.3.c.6. Wood platforms shall not be covered with opaque finishes, except that platform edges may be covered or marked for identification. Platforms may be coated periodically with wood preservatives, fire-retardant finishes, and slip-resistant finishes; however, the coating may not obscure the top or bottom wood surfaces.

33.2.3.c.7. Scaffold components manufactured by different manufacturers shall not be intermixed unless the components fit together without force and the scaffold's structural integrity is maintained by the user. Scaffold components manufactured by different manufacturers shall not be modified in order to intermix them unless a competent person determines the resulting scaffold is structurally sound.

33.2.3.c.8. Scaffold components made of dissimilar metals shall not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component to a level below that required by Paragraph 33.2.5.a.1.

#### 33.2.3.d. Criteria for supported scaffolds.

33.2.3.d.1. Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing, or equivalent means, as follows:

33.2.3.d.1.a. Guys, ties, and braces shall be installed at locations where horizontal members support both inner and outer legs.

33.2.3.d.1.b. Guys, ties, and braces shall be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the four to one (4:1) height and be repeated vertically at locations of horizontal members every twenty (20) feet or less thereafter for scaffolds three (3) feet wide or less, and every twenty-six (26) feet or less thereafter for scaffolds greater than three (3) feet wide. The top guy, tie or brace of completed scaffolds shall be placed no further than the four to one (4:1) height from the top. Such guys, ties and braces shall be installed at each end of the scaffold and at horizontal intervals not to exceed thirty (30) feet (measured from one end (not both) towards the other).

33.2.3.d.1.c. Ties, guys, braces, or outriggers shall be used to prevent the tipping of supported scaffolds in all circumstances where an eccentric load, such as a cantilevered work platform, is applied or is transmitted to the scaffold.

33.2.3.d.1.d. Supported scaffold poles, legs, posts, frames, and uprights shall bear on base plates and mud sills or other adequate firm foundation.

33.2.3.d.2. Supported scaffold poles, legs, posts, frames, and uprights shall bear on base plates and mud sills or other adequate firm foundation.

33.2.3.d.2.a. Footings shall be level, sound, rigid, and capable of supporting the loaded scaffold without settling or displacement.

33.2.3.d.2.b. Unstable objects shall not be used to support scaffolds or platform units.

33.2.3.d.2.c. Unstable objects shall not be used as working platforms.

33.2.3.d.2.d. Front-end loaders and similar pieces of equipment shall not be used to support scaffold platforms unless they have been specifically designed by the manufacturer for such use.

33.2.3.d.2.e. Fork-lifts shall not be used to support scaffold platforms unless the entire platform is attached to the fork and the fork-lift is not moved horizontally while the platform is occupied.

33.2.3.e. Supported scaffold poles, legs, posts, frames, and uprights shall be plumb and braced to prevent swaying and displacement.

33.2.3.f. Criteria for suspension scaffolds.

33.2.3.f.1. All suspension scaffold support devices, such as outrigger beams, cornice hooks, parapet clamps, and similar devices, shall rest on surfaces capable of supporting at least four (4) times the load imposed on them by the scaffold operating at the rated load of the hoist (or at least 1.5 times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater).

33.2.3.f.2. Suspension scaffold outrigger beams, when used, shall be made of structural metal or equivalent strength material, and shall be restrained to prevent movement.

33.2.3.f.3. The inboard ends of suspension scaffold outrigger beams shall be stabilized by bolts or other direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except masons' multi-point adjustable suspension scaffold outrigger beams shall not be stabilized by counterweights.

33.2.3.f.3.A. Before the scaffold is used, direct connections shall be evaluated by a competent person who shall confirm, based on the evaluation, that the supporting surfaces are capable of supporting the loads to be imposed. In addition, masons' multi-point adjustable suspension scaffold connections shall be designed by an engineer experienced in such scaffold design.

33.2.3.f.3.B. Counterweights shall be made of non-flowable material. Sand, gravel and similar materials that can be easily dislocated shall not be used as counterweights.

33.2.3.f.3.C. Only those items specifically designed as counterweights shall be used to counterweight scaffold systems. Construction materials such as, but not limited to, masonry units and rolls of roofing felt, shall not be used as counterweights.

33.2.3.f.3.D. Counterweights shall be secured by mechanical means to the outrigger beams to prevent accidental displacement.

33.2.3.f.3.E. Counterweights shall not be removed from an outrigger beam until the scaffold is disassembled.

33.2.3.f.3.F. Outrigger beams which are not stabilized by bolts or other direct connections to the floor or roof deck shall be secured by tiebacks.

33.2.3.f.3.G. Tiebacks shall be equivalent in strength to the suspension ropes.

33.2.3.f.3.H. Outrigger beams shall be placed perpendicular to its bearing support (usually the face of the building or structure). However, where the employer can demonstrate that it is not possible to place an outrigger beam perpendicular to the face of the building or structure because of obstructions that cannot be moved, the outrigger beam may be placed at some other angle, provided opposing angle tiebacks are used.

33.2.3.f.3.I. Tiebacks shall be secured to a structurally sound anchorage on the building or structure. Sound anchorages include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

33.2.3.f.3.J. Tiebacks shall be installed perpendicular to the face of the building or structure, or opposing angle tiebacks shall be installed. Single tiebacks installed at an angle are prohibited.

33.2.3.g. Suspension scaffold outrigger beams shall be:

33.2.3.g.1. Provided with stop bolts or shackles at both ends;

33.2.3.g.2. Securely fastened together with the flanges turned out when channel iron beams are used in place of I-beams;

33.2.3.g.3. Installed with all bearing supports perpendicular to the beam center line;

33.2.3.g.4. Set and maintained with the web in a vertical position; and

33.2.3.g.5. When an outrigger beam is used, the shackle or clevis with which the rope is attached to the outrigger beam shall be placed directly over the center line of the stirrup.

33.2.3.h. Suspension scaffold support devices such as cornice hooks, roof hooks, roof irons, parapet clamps, or similar devices shall be:

33.2.3.h.1. Made of steel, wrought iron, or materials of equivalent strength;

33.2.3.h.2. Supported by bearing blocks; and

33.2.3.h.3. Secured against movement by tiebacks installed at right angles to the face of the building or structure, or opposing angle tiebacks shall be installed and secured to a structurally sound point of anchorage on the building or structure. Sound points of anchorage include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

33.2.3.i. Tiebacks shall be equivalent in strength to the hoisting rope.

33.2.3.j. When winding drum hoists are used on a suspension scaffold, they shall contain not less than four (4) wraps of the suspension rope at the lowest point of scaffold travel. When other types of hoists are used, the suspension ropes shall be long enough to allow the scaffold to be lowered

to the level below without the rope end passing through the hoist, or the rope end shall be configured or provided with means to prevent the end from passing through the hoist.

33.2.3.k. The use of repaired wire rope as suspension rope is prohibited.

33.2.3.l. Wire suspension ropes shall not be joined together except through the use of eye splice thimbles connected with shackles or coverplates and bolts.

33.2.3.m. The load end of wire suspension ropes shall be equipped with proper size thimbles and secured by eyesplicing or equivalent means.

33.2.3.n. Ropes shall be inspected for defects by a competent person prior to each workshift and after every occurrence which could affect a rope's integrity. Ropes shall be replaced if any of the following conditions exist:

33.2.3.n.1. Any physical damage which impairs the function and strength of the rope.

33.2.3.n.2. Kinks that might impair the tracking or wrapping of rope around the drum(s) or sheave(s).

33.2.3.n.3. Six (6) randomly distributed broken wires in one (1) rope lay or three (3) broken wires in one (1) strand in one (1) rope lay.

33.2.3.n.4. Abrasion, corrosion, scrubbing, flattening or peening causing loss of more than one-third (1/3) of the original diameter of the outside wires.

33.2.3.n.5. Heat damage caused by a torch or any damage caused by contact with electrical wires.

33.2.3.n.6. Evidence that the secondary brake has been activated during an overspeed condition and has engaged the suspension rope.

33.2.3.o. Swaged attachments or spliced eyes on wire suspension ropes shall not be used unless they are made by the wire rope manufacturer or a qualified person.

33.2.3.p. When wire rope clips are used on suspension scaffolds:

33.2.3.p.1. There shall be a minimum of three (3) wire rope clips installed, with the clips a minimum of six (6) rope diameters apart;

33.2.3.p.2. Clips shall be installed according to the manufacturer's recommendations;

33.2.3.p.3. Clips shall be retightened to the manufacturer's recommendations after the initial loading;

33.2.3.p.4. Clips shall be inspected and retightened to the manufacturer's recommendations at the start of each workshift thereafter;

33.2.3.p.5. U-bolt clips shall not be used at the point of suspension for any scaffold hoist;

33.2.3.p.6. When U-bolt clips are used, the U-bolt shall be placed over the dead end of the rope, and the saddle shall be placed over the live end of the rope.

33.2.3.q. Suspension scaffold power-operated hoists and manual hoists shall be tested by a qualified testing laboratory.

33.2.3.r. Gasoline-powered equipment and hoists shall not be used on suspension scaffolds.

33.2.3.s. Gears and brakes of power-operated hoists used on suspension scaffolds shall be enclosed.

33.2.3.t. In addition to the normal operating brake, suspension scaffold power-operated hoists and manually operated hoists shall have a braking device or locking pawl which engages automatically when a hoist makes either of the following uncontrolled movements: an instantaneous change in momentum or an accelerated overspeed.

33.2.3.u. Manually operated hoists shall require a positive crank force to descend.

33.2.3.v. Two-point and multi-point suspension scaffolds shall be tied or otherwise secured to prevent them from swaying, as determined to be necessary based on an evaluation by a competent person. Window cleaners' anchors shall not be used for this purpose.

33.2.3.w. Devices whose sole function is to provide emergency escape and rescue shall not be used as working platforms. This provision does not preclude the use of systems which are designed to function both as suspension scaffolds and emergency systems.

33.2.3.x. Access. This Subdivision applies to scaffold access for all employees. Access requirements for employees erecting or dismantling supported scaffolds are specifically addressed in Subdivision 35.2.3.ee.

33.2.3.x.1. When scaffold platforms are more than two (2) feet above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used. Crossbraces shall not be used as a means of access.

33.2.3.x.2. Portable, hook-on, and attachable ladders (Additional requirements for the proper construction and use of portable ladders are contained in Subsection 36-23-33.1. -- Stairways and Ladders):

33.2.3.x.2.A. Portable, hook-on, and attachable ladders shall be positioned so as not to tip the scaffold;

33.2.3.x.2.B. Hook-on and attachable ladders shall be positioned so that their bottom rung is not more than twenty-four (24) inches above the scaffold supporting level;

33.2.3.x.2.C. When hook-on and attachable ladders are used on a supported scaffold more than thirty-five (35) feet high, they shall have rest platforms at thirty-five (35) foot maximum vertical intervals.

33.2.3.x.2.D. Hook-on and attachable ladders shall be specifically designed for use with the type of scaffold used;

33.2.3.x.2.E. Hook-on and attachable ladders shall have a minimum rung length of eleven and one-half (11-1/2) inches; and

33.2.3.x.2.F. Hook-on and attachable ladders shall have uniformly spaced rungs with a maximum spacing between rungs of sixteen and three-fourths (16-3/4) inches.

33.2.3.y. Stairway-type ladders shall:

33.2.3.y.1. Be positioned such that their bottom step is not more than twenty-four (24) inches above the scaffold supporting level;

33.2.3.y.2. Be provided with rest platforms at twelve (12) foot maximum vertical intervals;

33.2.3.y.3. Have a minimum step width of sixteen (16) inches, except that mobile scaffold stairway-type ladders shall have a minimum step width of eleven and one-half (11-1/2) inches; and

33.2.3.y.4. Have slip-resistant treads on all steps and landings.

33.2.3.z. Stair towers (scaffold stairway/towers) shall be positioned such that their bottom step is not more than twenty-four (24) inches above the scaffold supporting level.

33.2.3.z.1. A stairrail consisting of a toprail and a midrail shall be provided on each side of each scaffold stairway.

33.2.3.z.2. The toprail of each stairrail system shall also be capable of serving as a handrail, unless a separate handrail is provided.

33.2.3.z.3. Handrails, and toprails that serve as handrails, shall provide an adequate handhold for employees grasping them to avoid falling.

33.2.3.z.4. Stairrail systems and handrails shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

33.2.3.z.5. The ends of stairrail systems and handrails shall be constructed so that they do not constitute a projection hazard.

33.2.3.z.6. Handrails, and toprails that are used as handrails, shall be at least three (3) inches from other objects.

33.2.3.z.7. Stairrails shall be not less than twenty-eight (28) inches nor more than thirty-seven (37) inches from the upper surface of the stairrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

33.2.3.z.8. A landing platform at least eighteen (18) inches wide by at least eighteen (18) inches long shall be provided at each level.

33.2.3.z.9. Each scaffold stairway shall be at least eighteen (18) inches wide between stairrails.

33.2.3.z.10. Treads and landings shall have slip-resistant surfaces.

33.2.3.z.11. Stairways shall be installed between forty (40) degrees and sixty (60) degrees from the horizontal.

33.2.3.z.12. Guardrails meeting the requirements of Subdivision 33.2.3.ii. shall be provided on the open sides and ends of each landing.

33.2.3.z.13. Riser height shall be uniform, within one-fourth (1/4) inch, for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system, not for each flight of stairs.

33.2.3.z.14. Tread depth shall be uniform, within one-fourth (1/4) inch, for each flight of stairs.

33.2.3.aa. Ramps and walkways.

33.2.3.aa.1. Ramps and walkways six (6) feet or more above lower levels shall have guardrail systems which comply with §36-23-41 (fall protection);

33.2.3.aa.2. No ramp or walkway shall be inclined more than a slope of one (1) vertical to three (3) horizontal (twenty (20) degrees above the horizontal).

33.2.3.aa.3. If the slope of a ramp or a walkway is steeper than one (1) vertical in eight (8) horizontal, the ramp or walkway shall have cleats not more than fourteen (14) inches apart which are securely fastened to the planks to provide footing.

33.2.3.bb. Integral prefabricated scaffold access frames shall:

33.2.3.bb.1. Be specifically designed and constructed for use as ladder rungs;

33.2.3.bb.2. Have a rung length of at least eight (8) inches;

33.2.3.bb.3. Not be used as work platforms when rungs are less than eleven and one-half (11-1/2) inches in length, unless each affected employee uses fall protection, or a positioning device, which complies with §36-23-41.4. (fall protection systems criteria and practices);

33.2.3.bb.4. Be uniformly spaced within each frame section;

33.2.3.bb.5. Be provided with rest platforms at thirty-five (35) foot maximum vertical intervals on all supported scaffolds more than thirty-five (35) feet high; and

33.2.3.bb.6. Have a maximum spacing between rungs of sixteen and three-fourths (16-3/4) inches. Non-uniform rung spacing caused by joining end frames together is allowed, provided the resulting spacing does not exceed sixteen and three-fourths (16-3/4) inches.

33.2.3.cc. Steps and rungs of ladder and stairway type access shall line up vertically with

each other between rest platforms.

33.2.3.dd. Direct access to or from another surface shall be used only when the scaffold is not more than fourteen (14) inches horizontally and not more than twenty-four (24) inches vertically from the other surface.

33.2.3.ee. Access for employees erecting or dismantling supported scaffolds shall be in accordance with the following:

33.2.3.ee.1. The employer shall provide safe means of access for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. The employer shall have a competent person determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination shall be based on site conditions and the type of scaffold being erected or dismantled.

33.2.3.ee.2. Hook-on or attachable ladders shall be installed as soon as scaffold erection has progressed to a point that permits safe installation and use.

33.2.3.ee.3. When erecting or dismantling tubular welded frame scaffolds, (end) frames, with horizontal members that are parallel, level and are not more than twenty-two (22) inches apart vertically, may be used as climbing devices for access, provided they are erected in a manner that creates a usable ladder and provides good hand hold and foot space.

33.2.3.ee.4. Cross braces on tubular welded frame scaffolds shall not be used as a means of access or egress.

33.2.3.ff. Use.

33.2.3.ff.1. Scaffolds and scaffold components shall not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.

33.2.3.ff.2. The use of shore or lean-to scaffolds is prohibited.

33.2.3.ff.3. Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.

33.2.3.ff.4. Any part of a scaffold damaged or weakened such that its strength is less than that required by Subdivision 33.2.3.a. (capacity) shall be immediately repaired or replaced, braced to meet those provisions, or removed from service until repaired.

33.2.3.ff.5. Scaffolds shall not be moved horizontally while employees are on them, unless they have been designed by a registered professional engineer specifically for such movement or, for mobile scaffolds, where the provisions of Subsection 33.2.24. (mobile scaffolds) are followed.

33.2.3.ff.6. The clearance between scaffolds and power lines shall be as follows: Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than as follows:

Insulated Lines

<u>Voltage</u>	<u>Minimum Distance</u>	<u>Alternatives</u>
<u>Less than 300 volts</u>	<u>3 feet</u>	
<u>300 volts to 50 <del>kV</del> kV</u>	<u>10 feet</u>	
<u>More than 50 <del>kV</del> kV</u>	<u>10 feet plus 0.4 inches for each 1 <del>kV</del> kV over 50 <del>kV</del> kV</u>	<u>2 times the length of the line insulator, but never less than 10 feet</u>

Uninsulated lines

<u>Voltage</u>	<u>Minimum Distance</u>	<u>Alternatives</u>
<u>Less than 50 <del>kV</del> kV</u>	<u>10 feet</u>	
<u>More than 50 kV</u>	<u>10 feet plus 0.4 inches for each <del>kV</del> kV over 50 <del>kV</del> kV</u>	<u>2 times the length of the line insulator, but never less than 10 feet</u>

33.2.3.ff.6.A. Exception to Paragraph §36-23-33.2.3.ff.6.: Scaffolds and materials may be closer to power lines than specified above where such clearance is necessary for performance of work, and only after the utility company, or electrical system operator, has been notified of the need to work closer and the utility company, or electrical system operator, has deenergized the lines, relocated the lines, or installed protective coverings to prevent accidental contact with the lines.

33.2.3.ff.7. Scaffolds shall be erected, moved, dismantled, or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling or alteration. Such activities shall be performed only by experienced and trained employees selected for such work by the competent person.

33.2.3.ff.8. Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

33.2.3.ff.9. Where swinging loads are being hoisted onto or near scaffolds such that the loads might contact the scaffold, tag lines or equivalent measures to control the loads shall be used.

33.2.3.ff.10. Suspension ropes supporting adjustable suspension scaffolds shall be of a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms.

33.2.3.ff.11. Suspension ropes shall be shielded from heat-producing processes. When acids or other corrosive substances are used on a scaffold, the ropes shall be shielded, treated to protect against the corrosive substances, or shall be of a material that will not be damaged by the substance being used.

33.2.3.ff.12. Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined that it is safe for employees to be on the scaffold and those

employees are protected by a personal fall arrest system or wind screens. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces imposed.

33.2.3.ff.13. Debris shall not be allowed to accumulate on platforms.

33.2.3.ff.14. Makeshift devices, such as but not limited to boxes and barrels, shall not be used on top of scaffold platforms to increase the working level height of employees.

33.2.3.ff.15. Ladders shall not be used on scaffolds to increase the working level height of employees, except on large area scaffolds where employers have satisfied the following criteria:

33.2.3.ff.15.A. When the ladder is placed against a structure which is not a part of the scaffold, the scaffold shall be secured against the sideways thrust exerted by the ladder;

33.2.3.ff.15.B. The platform units shall be secured to the scaffold to prevent their movement;

33.2.3.ff.15.C. The ladder legs shall be on the same platform or other means shall be provided to stabilize the ladder against unequal platform deflection, and

33.2.3.ff.15.D. The ladder legs shall be secured to prevent them from slipping or being pushed off the platform.

33.2.3.ff.16. Platforms shall not deflect more than one-sixtieth (1/60) of the span when loaded.

33.2.3.ff.17. To reduce the possibility of welding current arcing through the suspension wire rope when performing welding from suspended scaffolds, the following precautions shall be taken, as applicable:

33.2.3.ff.17.A. An insulated thimble shall be used to attach each suspension wire rope to its hanging support (such as cornice hook or outrigger). Excess suspension wire rope and any additional independent lines from grounding shall be insulated;

33.2.3.ff.17.B. The suspension wire rope shall be covered with insulating material extending at least four (4) feet above the hoist. If there is a tail line below the hoist, it shall be insulated to prevent contact with the platform. The portion of the tail line that hangs free below the scaffold shall be guided or retained, or both, so that it does not become grounded;

33.2.3.ff.17.C. Each hoist shall be covered with insulated protective covers;

33.2.3.ff.17.D. In addition to a work lead attachment required by the welding process, a grounding conductor shall be connected from the scaffold to the structure. The size of this conductor shall be at least the size of the welding process work lead, and this conductor shall not be in series with the welding process or the work piece;

33.2.3.ff.17.E. If the scaffold grounding lead is disconnected at any time, the welding machine shall be shut off; and

33.2.3.ff.17.F. An active welding rod or uninsulated welding lead shall not be

allowed to contact the scaffold or its suspension system.

33.2.3.gg. Fall protection.

33.2.3.gg.1. Each employee on a scaffold more than ten (10) feet above a lower level shall be protected from falling to that lower level. Paragraphs 36-23-33.2.3.gg.2. through 36-23-33.2.3.gg.8. establish the types of fall protection to be provided to the employees on each type of scaffold. Subdivision 33.2.3.hh. addresses fall protection for scaffold erectors and dismantlers.

33.2.3.gg.1.A. Note to Paragraph 33.2.3.gg.1.: The fall protection requirements for employees installing suspension scaffold support systems on floors, roofs, and other elevated surfaces are set forth in §36-23-41.

33.2.3.gg.2. Each employee on a boatswain's chair, catenary scaffold, float scaffold, needle beam scaffold, or ladder jack scaffold shall be protected by a personal fall arrest system;

33.2.3.gg.3. Each employee on a single-point or two-point adjustable suspension scaffold shall be protected by both a personal fall arrest system and guardrail system;

33.2.3.gg.4. Each employee on a crawling board (chicken ladder) shall be protected by a personal fall arrest system, a guardrail system (with minimum two hundred (200) pound toprail capacity), or by a three-fourth (3/4) inch diameter grabline or equivalent handhold securely fastened beside each crawling board;

33.2.3.gg.5. Each employee on a self-contained adjustable scaffold shall be protected by a guardrail system (with minimum two hundred (200) pound toprail capacity) when the platform is supported by the frame structure, and by both a personal fall arrest system and a guardrail system (with minimum two hundred (200) pound toprail capacity) when the platform is supported by ropes;

33.2.3.gg.6. Each employee on a walkway located within a scaffold shall be protected by a guardrail system (with minimum two hundred (200) pound toprail capacity) installed within nine and one-half (9-1/2) inches of and along at least one (1) side of the walkway.

33.2.3.gg.7. Each employee performing overhand bricklaying operations from a supported scaffold shall be protected from falling from all open sides and ends of the scaffold (except at the side next to the wall being laid) by the use of a personal fall arrest system or guardrail system (with minimum two hundred (200) pound toprail capacity).

33.2.3.gg.8. For all scaffolds not otherwise specified in §§36-23-33.2.3.gg.2. through 36-23-33.2.3.gg.7., each employee shall be protected by the use of personal fall arrest systems or guardrail systems meeting the requirements of §36-23-33.2.3.ji.

33.2.3.hh. The employer shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.

33.2.3.ii. In addition to meeting the requirements of §36-23-41.4.4. (personal fall arrest systems), personal fall arrest systems used on scaffolds shall be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member. Vertical lifelines shall not be used when overhead

components, such as overhead protection or additional platform levels, are part of a single-point or two-point adjustable suspension scaffold.

33.2.3.ii.1. When vertical lifelines are used, they shall be fastened to a fixed safe point of anchorage, shall be independent of the scaffold, and shall be protected from sharp edges and abrasion. Safe points of anchorage include structural members of buildings, but do not include standpipes, vents, other piping systems, electrical conduit, outrigger beams, or counterweights.

33.2.3.ii.2. When horizontal lifelines are used, they shall be secured to two (2) or more structural members of the scaffold, or they may be looped around both suspension and independent suspension lines (on scaffolds so equipped) above the hoist and brake attached to the end of the scaffold. Horizontal lifelines shall not be attached only to the suspension ropes.

33.2.3.ii.3. When lanyards are connected to horizontal lifelines or structural members on a single-point or two-point adjustable suspension scaffold, the scaffold shall be equipped with additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in the event one or both of the suspension ropes fail. The independent support lines shall be equal in number and strength to the suspension ropes.

33.2.3.ii.4. Vertical lifelines, independent support lines, and suspension ropes shall not be attached to each other, nor shall they be attached to or use the same point of anchorage, nor shall they be attached to the same point on the scaffold or personal fall arrest system.

33.2.3.jj. Guardrail systems installed to meet the requirements of this Section shall comply with the following provisions (guardrail systems built in accordance with Appendix A for Subpart L of OSHA §1926 will be deemed to meet the requirements of §§36-23-33.2.3.jj.7., 36-23-2.33.jj.8., and 36-23-33.2.3.jj.9.

33.2.3.jj.1. Guardrail systems shall be installed along all open sides and ends of platforms. Guardrail systems shall be installed before the scaffold is released for use by employees other than erection/dismantling crews.

33.2.3.jj.2. The top edge height of toprails or equivalent member on supported scaffolds manufactured or placed in service after January 1, 2000 shall be installed between thirty-eight (38) inches and forty-five (45) inches above the platform surface. The top edge height on supported scaffolds manufactured and placed in service before January 1, 2000, and on all suspended scaffolds where both a guardrail and a personal fall arrest system are required shall be between thirty-six (36) inches and forty-five (45) inches. When conditions warrant, the height of the top edge may exceed the forty-five (45) inch height, provided the guardrail system meets all other criteria of §36-23-33.2.3.jj.

33.2.3.jj.3. When midrails, screens, mesh, intermediate vertical members, solid panels, or equivalent structural members are used, they shall be installed between the top edge of the guardrail system and the scaffold platform.

33.2.3.jj.4. When midrails are used, they shall be installed at a height approximately midway between the top edge of the guardrail system and the platform surface.

33.2.3.jj.5. When screens and mesh are used, they shall extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports.

33.2.3.jj.6. When intermediate members (such as balusters or additional rails) are used, they shall not be more than nineteen (19) inches apart.

33.2.3.jj.7. Each toprail or equivalent member of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along its top edge of at least one hundred (100) pounds for guardrail systems installed on single-point adjustable suspension scaffolds or two-point adjustable suspension scaffolds, and at least two hundred (200) pounds for guardrail systems installed on all other scaffolds.

33.2.3.jj.8. When the loads specified in §36-23-33.2.3.jj.7. are applied in a downward direction, the top edge shall not drop below the height above the platform surface that is prescribed in §36-23-33.2.3.jj.2.

33.2.3.jj.9. Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along the midrail or other member of at least seventy-five (75) pounds for guardrail systems with a minimum one hundred (100) pound toprail capacity, and at least one-hundred fifty (150) pounds for guardrail systems with a minimum two hundred (200) pound toprail capacity.

33.2.3.jj.10. Suspension scaffold hoists and non-walk-through stirrups may be used as end guardrails, if the space between the hoist or stirrup and the side guardrail or structure does not allow passage of an employee to the end of the scaffold.

33.2.3.jj.11. Guardrails shall be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

33.2.3.jj.12. The ends of all rails shall not overhang the terminal posts except when such overhang does not constitute a projection hazard to employees.

33.2.3.jj.13. Steel or plastic banding shall not be used as a toprail or midrail.

33.2.3.jj.14. Manila or plastic (or other synthetic) rope being used for toprails or midrails shall be inspected by a competent person as frequently as necessary to ensure that it continues to meet the strength requirements of §36-23-33.2.3.gg. (fall protection).

33.2.3.jj.15. Crossbracing is acceptable in place of a midrail when the crossing point of two (2) braces is between twenty (20) inches and thirty (30) inches above the work platform or as a toprail when the crossing point of two (2) braces is between thirty-eight (38) inches and forty-eight (48) inches above the work platform. The end points at each upright shall be no more than forty-eight (48) inches apart.

33.2.3.kk. Falling object protection.

33.2.3.kk.1. In addition to wearing hardhats each employee on a scaffold shall be provided with additional protection from falling hand tools, debris, and other small objects through the installation of toeboards, screens, or guardrail systems, or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect the falling objects. When the falling objects are too large, heavy or massive to be contained or deflected by any of the above-listed measures, the employer shall place such potential falling objects away from the edge of the surface from which they

could fall and shall secure those materials as necessary to prevent their falling.

33.2.3.kk.2. Where there is a danger of tools, materials, or equipment falling from a scaffold and striking employees below, the following provisions apply:

33.2.3.kk.2.A. The area below the scaffold to which objects can fall shall be barricaded, and employees shall not be permitted to enter the hazard area; or

33.2.3.kk.2.B. A toeboard shall be erected along the edge of platforms more than ten (10) feet above lower levels for a distance sufficient to protect employees below, except on float (ship) scaffolds where an edging of three-fourths by one and one-half ( $3/4 \times 1-1/2$ ) inch wood or equivalent may be used in lieu of toeboards;

33.2.3.kk.2.C. Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, paneling or screening extending from the toeboard or platform to the top of the guardrail shall be erected for a distance sufficient to protect employees below; or

33.2.3.kk.2.D. A guardrail system shall be installed with openings small enough to prevent passage of potential falling objects; or

33.2.3.kk.2.E. A canopy structure, debris net, or catch platform strong enough to withstand the impact forces of the potential falling objects shall be erected over the employees below.

33.2.3.kk.3. Canopies, when used for falling object protection, shall comply with the following criteria:

33.2.3.kk.3.A. Canopies shall be installed between the falling object hazard and the employees.

33.2.3.kk.3.B. When canopies are used on suspension scaffolds for falling object protection, the scaffold shall be equipped with additional independent support lines equal in number to the number of points supported, and equivalent in strength to the strength of the suspension ropes.

33.2.3.kk.3.C. Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

33.2.3.II. Where used, toeboards shall be:

33.2.3.II.1. Capable of withstanding, without failure, a force of at least fifty (50) pounds applied in any downward or horizontal direction at any point along the toeboard (toeboards built in accordance with Appendix A for Subpart L of OSHA §1926 will be deemed to meet this requirement); and

33.2.3.II.2. At least three and one-half ( $3-1/2$ ) inches high from the top edge of the toeboard to the level of the walking/working surface. Toeboards shall be securely fastened in place at the outermost edge of the platform and have not more than one-fourth ( $1/4$ ) inch clearance above the walking/working surface. Toeboards shall be solid or with openings not over one (1) inch in the greatest dimension.

33.2.4. Additional requirements for specific scaffolding.

33.2.4.a. Pole scaffolds.

33.2.4.a.1. When platforms are being moved to the next level, the existing platform shall be left undisturbed until the new bearers have been set in place and braced, prior to receiving the new platforms.

33.2.4.a.2. Crossbracing shall be installed between the inner and outer sets of poles on double pole scaffolds.

33.2.4.a.3. Diagonal bracing in both directions shall be installed across the entire inside face of double-pole scaffolds used to support loads equivalent to a uniformly distributed load of fifty (50) pounds or more per square foot.

33.2.4.a.4. Diagonal bracing in both directions shall be installed across the entire outside face of all double- and single-pole scaffolds.

33.2.4.a.5. Runners and bearers shall be installed on edge.

33.2.4.a.6. Bearers shall extend a minimum of three (3) inches over the outside edges of runners.

33.2.4.a.7. Runners shall extend over a minimum of two (2) poles, and shall be supported by bearing blocks securely attached to the poles.

33.2.4.a.8. Braces, bearers, and runners shall not be spliced between poles.

33.2.4.a.9. Where wooden poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section. Wood splice plates shall be provided on at least two (2) adjacent sides, and shall extend at least two (2) feet on either side of the splice, overlap the abutted ends equally, and have at least the same cross-sectional areas as the pole. Splice plates of other materials of equivalent strength may be used.

33.2.4.a.10. Pole scaffolds over sixty (60) feet in height shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with that design. Non-mandatory Appendix A for Subpart L of OSHA §1926 contains examples of criteria that will enable an employer to comply with design and loading requirements for pole scaffolds under sixty (60) feet in height.

33.2.4.b. Tube and coupler scaffolds.

33.2.4.b.1. When platforms are being moved to the next level, the existing platform shall be left undisturbed until the new bearers have been set in place and braced prior to receiving the new platforms.

33.2.4.b.2. Transverse bracing forming an "X" across the width of the scaffold shall be installed at the scaffold ends and at least at every third set of posts horizontally (measured from only one end) and every fourth runner vertically. Bracing shall extend diagonally from the inner or outer posts or runners upward to the next outer or inner posts or runners. Building ties shall be installed at the bearer levels between the transverse bracing and shall conform to the requirements of §36-23-33.2.3.d.1.

33.2.4.b.3. On straight run scaffolds, longitudinal bracing across the inner and outer rows of posts shall be installed diagonally in both directions, and shall extend from the base of the end posts upward to the top of the scaffold at approximately a forty-five (45) degree angle. On scaffolds whose length is greater than their height, such bracing shall be repeated beginning at least at every fifth post. On scaffolds whose length is less than their height, such bracing shall be installed from the base of the end posts upward to the opposite end posts, and then in alternating directions until reaching the top of the scaffold. Bracing shall be installed as close as possible to the intersection of the bearer and post or runner and post.

33.2.4.b.4. Where conditions preclude the attachment of bracing to posts, bracing shall be attached to the runners as close to the post as possible.

33.2.4.b.5. Bearers shall be installed transversely between posts, and when coupled to the posts, shall have the inboard coupler bear directly on the runner coupler. When the bearers are coupled to the runners, the couplers shall be as close to the posts as possible.

33.2.4.b.6. Bearers shall extend beyond the posts and runners, and shall provide full contact with the coupler.

33.2.4.b.7. Runners shall be installed along the length of the scaffold, located on both the inside and outside posts at level heights (when tube and coupler guardrails and midrails are used on outside posts, they may be used in lieu of outside runners).

33.2.4.b.8. Runners shall be interlocked on straight runs to form continuous lengths, and shall be coupled to each post. The bottom runners and bearers shall be located as close to the base as possible.

33.2.4.b.9. Couplers shall be of a structural metal, such as drop-forged steel, malleable iron, or structural grade aluminum. The use of gray cast iron is prohibited.

33.2.4.b.10. Tube and coupler scaffolds over one hundred twenty-five (125) feet in height shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with such design. Non-mandatory Appendix A for Subpart L of OSHA §1926 contains examples of criteria that will enable an employer to comply with design and loading requirements for tube and coupler scaffolds under one hundred twenty-five (125) feet in height.

#### 33.2.4.c. Fabricated frame scaffolds (tubular welded frame scaffolds).

33.2.4.c.1. When moving platforms to the next level, the existing platform shall be left undisturbed until the new end frames have been set in place and braced prior to receiving the new platforms.

33.2.4.c.2. Frames and panels shall be braced by cross, horizontal, or diagonal braces, or combination thereof, which secure vertical members together laterally. The cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, level, and square. All brace connections shall be secured.

33.2.4.c.3. Frames and panels shall be joined together vertically by coupling or stacking pins or equivalent means.

33.2.4.c.4. Where uplift can occur which would displace scaffold end frames or panels, the frames or panels shall be locked together vertically by pins or equivalent means.

33.2.4.c.5. Brackets used to support cantilevered loads shall:

33.2.4.c.5.A. Be seated with side-brackets parallel to the frames and end-brackets at ninety (90) degrees to the frames;

33.2.4.c.5.B. Not be bent or twisted from these positions; and

33.2.4.c.5.C. Be used only to support personnel, unless the scaffold has been designed for other loads by a qualified engineer and built to withstand the tipping forces caused by those other loads being placed on the bracket-supported section of the scaffold.

33.2.4.c.6. Scaffolds over one hundred twenty-five (125) feet in height above their base plates shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with such design.

33.2.5. Plasterers', decorators', and large area scaffolds. Scaffolds shall be constructed in accordance with §§36-23-33.2.4.a. (pole scaffolds), 36-23-33.2.4.b. (tube and coupler scaffolds), and 36-23-33.2.4.c. (fabricated frame scaffolds), as appropriate.

33.2.6. Bricklayers' square scaffolds (squares).

33.2.6.a. Scaffolds made of wood shall be reinforced with gussets on both sides of each corner.

33.2.6.b. Diagonal braces shall be installed on all sides of each square.

33.2.6.c. Diagonal braces shall be installed between squares on the rear and front sides of the scaffold, and shall extend from the bottom of each square to the top of the next square.

33.2.6.d. Scaffolds shall not exceed three (3) tiers in height, and shall be so constructed and arranged that one (1) square rests directly above the other. The upper tiers shall stand on a continuous row of planks laid across the next lower tier, and shall be nailed down or otherwise secured to prevent displacement.

33.2.7. Horse scaffolds.

33.2.7.a. Scaffolds shall not be constructed or arranged more than two (2) tiers or ten (10) feet in height, whichever is less.

33.2.7.b. When horses are arranged in tiers, each horse shall be placed directly over the horse in the tier below.

33.2.7.c. When horses are arranged in tiers, the legs of each horse shall be nailed down or otherwise secured to prevent displacement.

33.2.7.d. When horses are arranged in tiers, each tier shall be crossbraced.

33.2.8. Form scaffolds and carpenters' bracket scaffolds.

33.2.8.a. Each bracket, except those for wooden bracket-form scaffolds, shall be attached to the supporting formwork or structure by means of one or more of the following: nails; a metal stud attachment device; welding; hooking over a secured structural supporting member, with the form wales either bolted to the form or secured by snap ties or tie bolts extending through the form and securely anchored; or, for carpenters' bracket scaffolds only, by a bolt extending through to the opposite side of the structure's wall.

33.2.8.b. Wooden bracket-form scaffolds shall be an integral part of the form panel.

33.2.8.c. Folding type metal brackets, when extended for use, shall be either bolted or secured with a locking-type pin.

33.2.9. Roof bracket scaffolds.

33.2.9.a. Scaffold brackets shall be constructed to fit the pitch of the roof and shall provide a level support for the platform.

33.2.9.b. Brackets (including those provided with pointed metal projections) shall be anchored in place by nails unless it is impractical to use nails. When nails are not used, brackets shall be secured in place with first-grade manila rope of at least three-fourths (3/4) inch diameter, or equivalent.

33.2.10. Outrigger scaffolds.

33.2.10.a. The inboard end of outrigger beams, measured from the fulcrum point to the extreme point of anchorage, shall not be less than one and one-half (1-1/2) times the outboard end in length.

33.2.10.b. Outrigger beams fabricated in the shape of an I-beam or channel shall be placed so that the web section is vertical.

33.2.10.c. The fulcrum point of outrigger beams shall rest on secure bearings at least six (6) inches in each horizontal dimension.

33.2.10.d. Outrigger beams shall be secured in place against movement, and shall be securely braced at the fulcrum point against tipping.

33.2.10.e. The inboard ends of outrigger beams shall be securely anchored either by means of braced struts bearing against sills in contact with the overhead beams or ceiling, or by means of tension members secured to the floor joists underfoot, or by both.

33.2.10.f. The entire supporting structure shall be securely braced to prevent any horizontal movement.

33.2.10.g. To prevent their displacement, platform units shall be nailed, bolted, or otherwise secured to outriggers.

33.2.10.h. Scaffolds and scaffold components shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with such design.

33.2.11. Pump jack scaffolds.

33.2.11.a. Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles. Each pump jack bracket shall have two (2) positive gripping mechanisms to prevent any failure or slippage.

33.2.11.b. Poles shall be secured to the structure by rigid triangular bracing or equivalent at the bottom, top, and other points as necessary. When the pump jack has to pass bracing already installed, an additional brace shall be installed approximately four (4) feet above the brace to be passed, and shall be left in place until the pump jack has been moved and the original brace reinstalled.

33.2.11.c. When guardrails are used for fall protection, a workbench may be used as the toprail only if it meets all the requirements in §§36-23-33.2.3.jj.2., 36-23-33.2.3.jj.7., 36-23-33.2.3.jj.8., and 36-23-33.2.3.jj.13.

33.2.11.d. Work benches shall not be used as scaffold platforms.

33.2.11.e. When poles are made of wood, the pole lumber shall be straight-grained, free of shakes, large loose or dead knots, and other defects which might impair strength.

33.2.11.f. When wood poles are constructed of two (2) continuous lengths, they shall be joined together with the seam parallel to the bracket.

33.2.11.g. When two by fours (2x4) are spliced to make a pole, mending plates shall be installed at all splices to develop the full strength of the member.

33.2.12. Ladder jack scaffolds.

33.2.12.a. Platforms shall not exceed a height of twenty (20) feet.

33.2.12.b. All ladders used to support ladder jack scaffolds shall meet the requirements of §36-23-33.1. (Stairways and Ladders), except that job-made ladders shall not be used to support ladder jack scaffolds.

33.2.12.c. The ladder jack shall be so designed and constructed that it will bear on the side rails and ladder rungs or on the ladder rungs alone. If bearing on rungs only, the bearing area shall include a length of at least ten (10) inches on each rung.

33.2.12.d. Ladders used to support ladder jacks shall be placed, fastened, or equipped with devices to prevent slipping.

33.2.12.e. Scaffold platforms shall not be bridged one to another.

33.2.13. Window jack scaffolds.

33.2.13.a. Scaffolds shall be securely attached to the window opening.

33.2.13.b. Scaffolds shall be used only for the purpose of working at the window opening through which the jack is placed.

33.2.13.c. Window jacks shall not be used to support planks placed between one (1) window jack and another, or for other elements of scaffolding.

33.2.14. Crawling boards (chicken ladders).

33.2.14.a. Crawling boards shall extend from the roof peak to the eaves when used in connection with roof construction, repair, or maintenance.

33.2.14.b. Crawling boards shall be secured to the roof by ridge hooks or by means that meet equivalent criteria (e.g., strength and durability).

33.2.15. Step, platform, and trestle ladder scaffolds.

33.2.15.a. Scaffold platforms shall not be placed any higher than the second highest rung or step of the ladder supporting the platform.

33.2.15.b. All ladders used in conjunction with step, platform and trestle ladder scaffolds shall meet the pertinent requirements of §36-23-33.1. (Stairways and Ladders), except that job-made ladders shall not be used to support such scaffolds.

33.2.15.c. Ladders used to support step, platform, and trestle ladder scaffolds shall be placed, fastened, or equipped with devices to prevent slipping.

33.2.15.d. Scaffolds shall not be bridged one to another.

33.2.16. Single-point adjustable suspension scaffolds.

33.2.16.a. When two (2) single-point adjustable suspension scaffolds are combined to form a two-point adjustable suspension scaffold, the resulting two-point scaffold shall comply with the requirements for two-point adjustable suspension scaffolds in §36-23-33.2.17.

33.2.16.b. The supporting rope between the scaffold and the suspension device shall be kept vertical unless all of the following conditions are met:

33.2.16.b.1. The rigging has been designed by a qualified person, and

33.2.16.b.2. The scaffold is accessible to rescuers, and

33.2.16.b.3. The supporting rope is protected to ensure that it will not chafe at any point where a change in direction occurs, and

33.2.16.b.4. The scaffold is positioned so that swinging cannot bring the scaffold into contact with another surface.

33.2.16.c. Boatswains' chair tackle shall consist of correct size ball bearings or bushed blocks containing safety hooks and properly "eye-spliced" minimum five-eighths (5/8) inch diameter first-grade manila rope, or other rope which will satisfy the criteria (e.g., strength and durability) of manila rope.

33.2.16.d. Boatswains' chair seat slings shall be reeved through four corner holes in the seat; shall cross each other on the underside of the seat; and shall be rigged so as to prevent slippage

which could cause an out-of-level condition.

33.2.16.e. Boatswains' chair seat slings shall be a minimum of five-eighths (5/8) inch diameter fiber, synthetic, or other rope which will satisfy the criteria (e.g., strength, slip resistance, durability, etc.) of first grade manila rope.

33.2.16.f. When a heat-producing process such as gas or arc welding is being conducted, boatswains' chair seat slings shall be a minimum of three-eighths (3/8) inch wire rope.

33.2.16.g. Non-cross-laminated wood boatswains' chairs shall be reinforced on their underside by cleats securely fastened to prevent the board from splitting.

33.2.17. Two-point adjustable suspension scaffolds (swing stages). The following requirements do not apply to two-point adjustable suspension scaffolds used as masons' or stonemasons' scaffolds. Such scaffolds are covered by §36-23-33.2.18.

33.2.17.a. Platforms shall not be more than thirty-six (36) inches wide unless designed by a qualified person to prevent unstable conditions.

33.2.17.b. The platform shall be securely fastened to hangers (stirrups) by U-bolts or by other means which satisfy the requirements of §36-23-33.2.3.a. (capacity).

33.2.17.c. The blocks for fiber or synthetic ropes shall consist of at least one (1) double and one (1) single block. The sheaves of all blocks shall fit the size of the rope used.

33.2.17.d. Platforms shall be of the ladder-type, plank-type, beam-type, or light-metal type. Light metal-type platforms having a rated capacity of seven hundred fifty (750) pounds or less and platforms forty (40) feet or less in length shall be tested and listed by a nationally recognized testing laboratory.

33.2.17.e. Two-point scaffolds shall not be bridged or otherwise connected one to another during raising and lowering operations unless the bridge connections are articulated (attached), and the hoists properly sized.

33.2.17.f. Passage may be made from one (1) platform to another only when the platforms are at the same height, are abutting, and walk-through stirrups specifically designed for this purpose are used.

33.2.18. Multi-point adjustable suspension scaffolds, stonemasons' multi-point adjustable suspension scaffolds, and masons' multi-point adjustable suspension scaffolds.

33.2.18.a. When two (2) or more scaffolds are used they shall not be bridged one to another unless they are designed to be bridged, the bridge connections are articulated, and the hoists are properly sized.

33.2.18.b. If bridges are not used, passage may be made from one (1) platform to another only when the platforms are at the same height and are abutting.

33.2.18.c. Scaffolds shall be suspended from metal outriggers, brackets, wire rope slings, hooks, or means that meet equivalent criteria (e.g., strength, durability).

33.2.19. Catenary scaffolds.

33.2.19.a. No more than one (1) platform shall be placed between consecutive vertical pickups, and no more than two (2) platforms shall be used on a catenary scaffold.

33.2.19.b. Platforms supported by wire ropes shall have hook-shaped stops on each end of the platforms to prevent them from slipping off the wire ropes. These hooks shall be so placed that they will prevent the platform from falling if one of the horizontal wire ropes breaks.

33.2.19.c. Wire ropes shall not be tightened to the extent that the application of a scaffold load will overstress them.

33.2.19.d. Wire ropes shall be continuous and without splices between anchors.

33.2.20. Float (ship) scaffolds.

33.2.20.a. The platform shall be supported by a minimum of two (2) bearers, each of which shall project a minimum of six (6) inches beyond the platform on both sides. Each bearer shall be securely fastened to the platform.

33.2.20.b. Rope connections shall be such that the platform cannot shift or slip.

33.2.20.c. When only two (2) ropes are used with each float:

33.2.20.c.1. They shall be arranged so as to provide four (4) ends which are securely fastened to overhead supports.

33.2.20.c.2. Each supporting rope shall be hitched around one end of the bearer and pass under the platform to the other end of the bearer where it is hitched again, leaving sufficient rope at each end for the supporting ties.

33.2.21. Interior hung scaffolds.

33.2.21.a. Scaffolds shall be suspended only from the roof structure or other structural member such as ceiling beams.

33.2.21.b. Overhead supporting members (roof structure, ceiling beams, or other structural members) shall be inspected and checked for strength before the scaffold is erected.

33.2.21.c. Suspension ropes and cables shall be connected to the overhead supporting members by shackles, clips, thimbles, or other means that meet equivalent criteria (e.g., strength, durability).

33.2.22. Needle beam scaffolds.

33.2.22.a. Scaffold support beams shall be installed on edge.

33.2.22.b. Ropes or hangers shall be used for supports, except that one end of a needle beam scaffold may be supported by a permanent structural member.

33.2.22.c. The ropes shall be securely attached to the needle beams.

33.2.22.d. The support connection shall be arranged so as to prevent the needle beam from rolling or becoming displaced.

33.2.22.e. Platform units shall be securely attached to the needle beams by bolts or equivalent means. Cleats and overhang are not considered to be adequate means of attachment.

33.2.23. Multi-level suspended scaffolds.

33.2.23.a. Scaffolds shall be equipped with additional independent support lines, equal in number to the number of points supported, and of equivalent strength to the suspension ropes, and rigged to support the scaffold in the event the suspension rope(s) fail.

33.2.23.b. Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

33.2.23.c. Supports for platforms shall be attached directly to the support stirrup and not to any other platform.

33.2.24. Mobile scaffolds.

33.2.24.a. Scaffolds shall be braced by cross, horizontal, or diagonal braces, or combination thereof, to prevent racking or collapse of the scaffold and to secure vertical members together laterally so as to automatically square and align the vertical members. Scaffolds shall be plumb, level, and squared. All brace connections shall be secured.

33.2.24.a.1. Scaffolds constructed of tube and coupler components shall also comply with the requirements of §36-23-33.2.4.b.;

33.2.24.a.2. Scaffolds constructed of fabricated frame components shall also comply with the requirements of §36-23-33.2.4.c.

33.2.24.b. Scaffold casters and wheels shall be locked with positive wheel and/or wheel and swivel locks, or equivalent means, to prevent movement of the scaffold while the scaffold is used in a stationary manner.

33.2.24.c. Manual force used to move the scaffold shall be applied as close to the base as practicable, but not more than five (5) feet above the supporting surface.

33.2.24.d. Power systems used to propel mobile scaffolds shall be designed for such use. Forklifts, trucks, similar motor vehicles or add-on motors shall not be used to propel scaffolds unless the scaffold is designed for such propulsion systems.

33.2.24.e. Scaffolds shall be stabilized to prevent tipping during movement.

33.2.24.f. Employees shall not be allowed to ride on scaffolds unless the following conditions exist:

33.2.24.f.1. The surface on which the scaffold is being moved is within three (3) degrees

of level, and free of pits, holes, and obstructions;

33.2.24.f.2. The height to base width ratio of the scaffold during movement is two to one or less, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements such as those listed in paragraph 2.(w) of Appendix A for Subpart L of OSHA §1926;

33.2.24.f.3. Outrigger frames, when used, are installed on both sides of the scaffold;

33.2.24.f.4. When power systems are used, the propelling force is applied directly to the wheels, and does not produce a speed in excess of one (1) foot per second; and

33.2.24.f.5. No employee is on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.

33.2.24.g. Platforms shall not extend outward beyond the base supports of the scaffold unless outrigger frames or equivalent devices are used to ensure stability.

33.2.24.h. Where leveling of the scaffold is necessary, screw jacks or equivalent means shall be used.

33.2.24.i. Caster stems and wheel stems shall be pinned or otherwise secured in scaffold legs or adjustment screws.

33.2.24.j. Before a scaffold is moved, each employee on the scaffold shall be made aware of the move.

#### 33.2.25. Repair bracket scaffolds.

33.2.25.a. Brackets shall be secured in place by at least one (1) wire rope at least one-half (1/2) inch in diameter.

33.2.25.b. Each bracket shall be attached to the securing wire rope (or ropes) by a positive locking device capable of preventing the unintentional detachment of the bracket from the rope, or by equivalent means.

33.2.25.c. Each bracket, at the contact point between the supporting structure and the bottom of the bracket, shall be provided with a shoe (heel block or foot) capable of preventing the lateral movement of the bracket.

33.2.25.d. Platforms shall be secured to the brackets in a manner that will prevent the separation of the platforms from the brackets and the movement of the platforms or the brackets on a completed scaffold.

33.2.25.e. When a wire rope is placed around the structure in order to provide a safe anchorage for personal fall arrest systems used by employees erecting or dismantling scaffolds, the wire rope shall meet the requirements of §36-23-41 (fall protection), but shall be at least five-sixteenths (5/16) inch in diameter.

33.2.25.f. Each wire rope used for securing brackets in place or as an anchorage for personal

fall arrest systems shall be protected from damage due to contact with edges, corners, protrusions, or other discontinuities of the supporting structure or scaffold components.

33.2.25.g. Tensioning of each wire rope used for securing brackets in place or as an anchorage for personal fall arrest systems shall be by means of a turnbuckle at least one (1) inch in diameter, or by equivalent means.

33.2.25.h. Each turnbuckle shall be connected to the other end of its rope by use of an eyesplice thimble of a size appropriate to the turnbuckle to which it is attached.

33.2.25.i. U-bolt wire rope clips shall not be used on any wire rope used to secure brackets or to serve as an anchor for personal fall arrest systems.

33.2.25.j. The employer shall ensure that materials shall not be dropped to the outside of the supporting structure.

33.2.25.k. Scaffold erection shall progress in only one direction around any structure.

33.2.26. Stilts. Stilts, when used, shall be used in accordance with the following requirements:

33.2.26.a. An employee may wear stilts on a scaffold only if it is a large area scaffold.

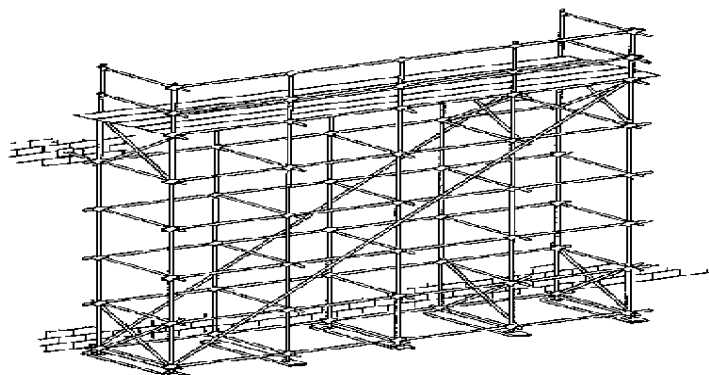
33.2.26.b. When an employee is using stilts on a large area scaffold where a guardrail system is used to provide fall protection, the guardrail system shall be increased in height by an amount equal to the height of the stilts being used by the employee.

33.2.26.c. Surfaces on which stilts are used shall be flat and free of pits, holes and obstructions, such as debris, as well as other tripping and falling hazards.

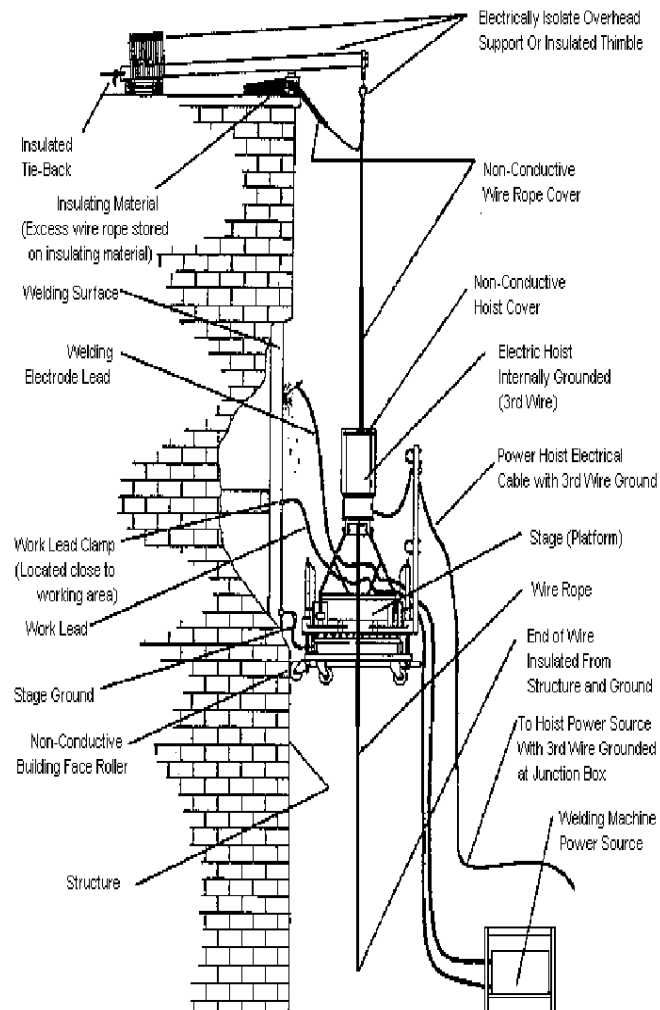
33.2.26.d. Stilts shall be properly maintained. Any alteration of the original equipment shall be approved by the manufacturer.

33.3. Scaffolding drawings and illustrations.

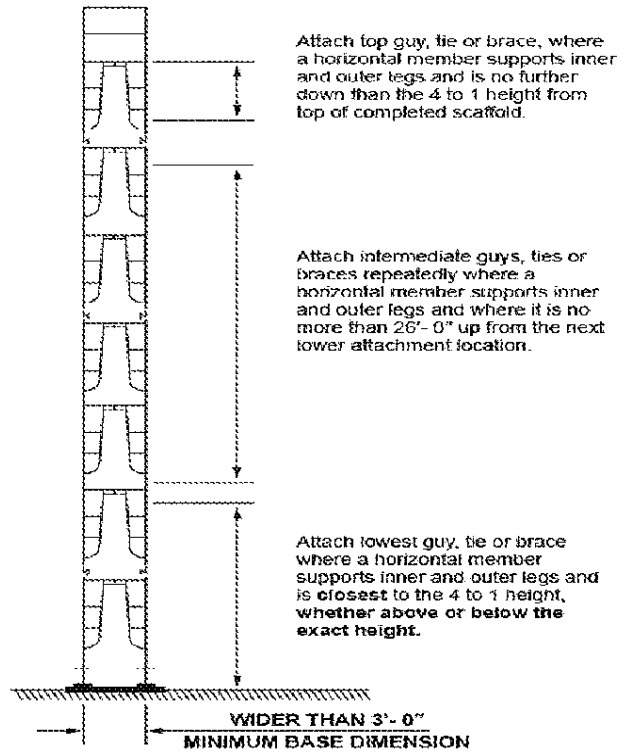
#### **BRACING - TUBE & COUPLER SCAFFOLDS**



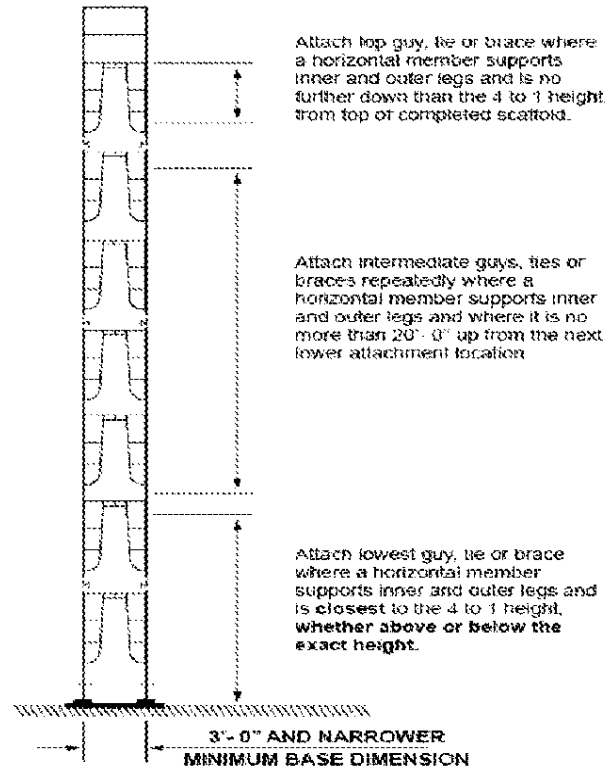
## SUSPENDED SCAFFOLD PLATFORM WELDING PRECAUTIONS



### MAXIMUM VERTICAL GUY, TIE OR BRACE SPACING WIDER THAN 3'- 0" BASES



### MAXIMUM VERTICAL GUY, TIE OR BRACE SPACING 3'- 0" AND NARROWER BASES



## SCAFFOLDING WORK SURFACES



LAMINATED  
VENIER  
LUMBER  
(LVL)

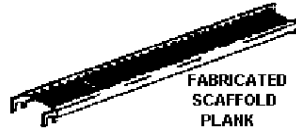


SOLID  
SAWN  
LUMBER

### SCAFFOLD PLANKS



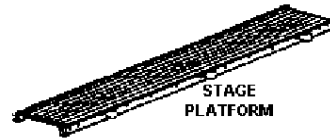
FABRICATED  
SCAFFOLD  
DECK



FABRICATED  
SCAFFOLD  
PLANK



DECORATOR PLANK



STAGE  
PLATFORM

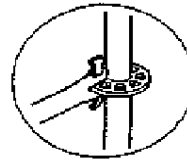
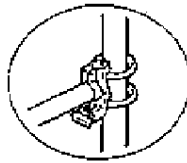


WOOD  
SCAFFOLD  
PLATFORM

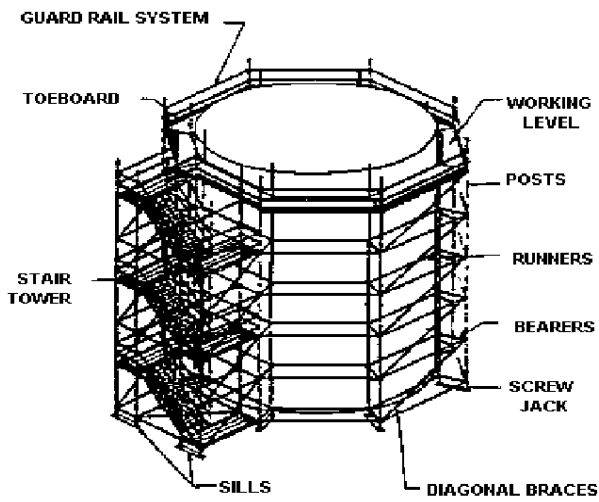
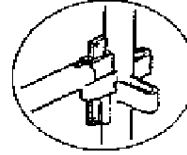
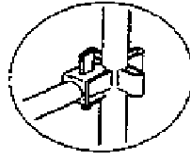


METAL  
SCAFFOLD  
PLATFORM

## SYSTEM SCAFFOLD



JOINT CONNECTIONS  
VARY ACCORDING  
TO MANUFACTURER



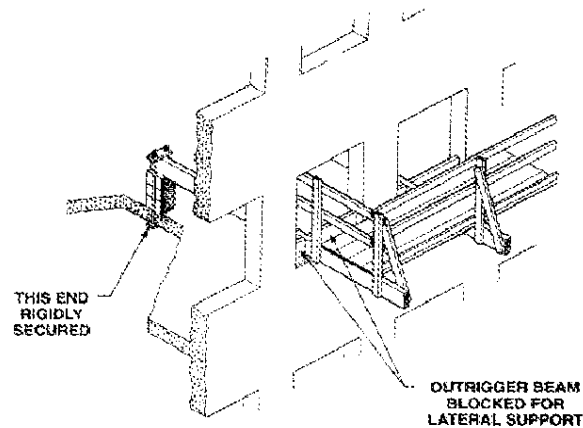
MILL 10  
**WG** **SEL STR**  
**LB**  
SCAF PLK  
D. 1 1/2" N. 10" W

Order using quantity of 1000. Stock levels subject to change.

\$118.00 INQ 65  
R019 Star **7**  
**SCAFFOLD PLANK**

Order using quantity of 1000. Stock levels subject to change.

## OUTRIGGER SCAFFOLD



### 33.4. General requirements -- aerial lifts.

33.4.1. Unless otherwise provided in this Section, aerial lifts acquired for use on or after January 22, 1973 shall be designed and constructed in conformance with the applicable requirements of the American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix. Aerial lifts acquired before January 22, 1973 which do not meet the requirements of ANSI A92.2-1969, may not be used after January 1, 1976, unless they shall have been modified so as to conform with the applicable design and construction requirements of ANSI A92.2-1969. Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground:

33.4.1.a. Extensible boom platforms;

33.4.1.b. Aerial ladders;

33.4.1.c. Articulating boom platforms;

33.4.1.d. Vertical towers; and

33.4.1.e. A combination of any such devices. Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated; and are deemed to be whether or not they are capable of rotating about a substantially vertical axis.

33.4.2. Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and this Section and to be at least as safe as the equipment was before modification.

### 33.5. Specific requirements -- aerial lifts.

33.5.1. Ladder trucks and tower trucks. Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.

33.5.1.a. Extensible and articulating boom platforms.

33.5.1.a.1. Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

33.5.1.b. Only authorized persons shall operate an aerial lift.

33.5.1.c. Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.

33.5.1.d. Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

33.5.1.e. A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift.

33.5.1.e.1. Note to Subdivision 33.5.1.e.: As of January 1, 1998, §36-23.41.4.4. provides that body belts are not acceptable as part of a personal fall arrest system. The use of a body belt in a tethering system or in a restraint system is acceptable and is regulated under §36-23-41.4.5.

33.5.1.f. Boom and basket load limits specified by the manufacturer shall not be exceeded.

33.5.1.g. The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.

33.5.1.h. An aerial lift truck shall not be moved when the boom is elevated in a working position with employees in the basket, except for equipment which is specifically designed for this type of operation in accordance with the provisions of §§36-23-33.4.a. and 36-23-33.4.b.

33.5.1.i. Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.

33.5.1.j. Climbers shall not be worn while performing work from an aerial lift.

33.5.1.k. The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value.

33.5.1.l. Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position except as provided in §36-23-33.5.1.h.

33.5.2. Electrical tests. All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5. However, equivalent d.c. voltage tests may be used in lieu of the a.c. voltage specified in

A92.2-1969; d.c. voltage tests which are approved by the equipment manufacturer or equivalent entity shall be considered an equivalent test.

33.5.3. Bursting safety factor. The provisions of the American National Standards Institute standard ANSI A92.2-1969, section 4.9 Bursting Safety Factor shall apply to all critical hydraulic and pneumatic components. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least two to one (2 to 1).

33.5.3.a. Welding standards. All welding shall conform to the following standards as applicable:

33.5.3.a.1. Standard Qualification Procedure, AWS B3.0-41.

33.5.3.a.2. Recommended Practices for Automotive Welding Design, AWS D8.4-61.

33.5.3.a.3. Standard Qualification of Welding Procedures and Welders for Piping and Tubing, AWS D10.9-69.

33.5.3.a.4. Specifications for Welding Highway and Railway Bridges, AWS D2.0-69.

33.5.3.a.4.A. Note to §36-23-33.5.: OSHA Non-mandatory Appendix C to this Subpart lists examples of national consensus standards that are considered to provide employee protection equivalent to that provided through the application of ANSI A92.2-1969, where appropriate. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from the American National Standards Institute. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N2634, Washington, DC or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

### **~~§36-23-33. Ladders and Scaffolding:~~**

~~— 33.1. Ladders:~~

~~—— (a) General requirements:~~

~~———— (1) Except where either permanent or temporary stairways or suitable ramps or runways are provided, ladders described in this subpart shall be used to give safe access to all elevations. All ladders shall be inspected by a competent person before each use. Ladders with defects shall be removed from service:~~

~~———— (2) The use of ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction is prohibited. When ladders with such defects are discovered, they shall be immediately withdrawn from service. Inspection of metal ladders shall include checking for corrosion of interiors or open end hollow rungs:~~

~~———— (3) Manufactured portable wood ladders provided by the employer shall be in accordance with the provisions of the ANSI A14.1-1968, Safety Code for Portable Wood Ladders:~~

~~———— (4) Portable metal ladders shall be of strength equivalent to that of wood ladders. Manufactured portable metal ladders provided by the employer shall be in accordance with the~~

provisions of the ANSI, A14.2-1956, Safety Code for Portable Metal Ladders:

~~————— (5) Fixed ladders shall be in accordance with the provisions of the American National Standards Institute A14.3-1956, Safety Code for Fixed Ladders:~~

~~————— (6) Portable ladder feet shall be placed on a substantial base, and the area around the top and bottom of the ladder shall be kept clear:~~

~~————— (7) Portable ladders shall be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is about one-quarter of the working length of the ladder (the length along the ladder between the foot and the top support.) Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds:~~

~~————— (8) Ladders shall not be placed in passageways, doorways, driveways, or any location where they may be displaced by activities being conducted on any work unless protected by barricades or guards:~~

~~————— (9) The side rails shall extend not less than thirty-six (36) inches above the landing. When this is not practical, grab rails, which provide a secure grip for an employee moving to or from the point of access, shall be installed:~~

~~————— (10) Portable ladders in use shall be tied, blocked, or otherwise secured to prevent their being displaced:~~

~~————— (11) Portable metal ladders shall not be used for electrical work or where they may contact electrical conductors:~~

~~————— (b) Job-made ladders:~~

~~————— (1) Job-made ladders shall be constructed for intended use. If a ladder is to provide the only means of access or exit from a working area for twenty-five (25) or more employees, or simultaneous two (2) way traffic is expected, a double cleat ladder shall be installed:~~

~~————— (2) Double cleat ladders shall not exceed twenty-four (24) feet in length:~~

~~————— (3) Single cleat ladders shall not exceed thirty (30) feet in length between supports (base and top landing). If ladders are to connect different landings, or if the length required exceeds this maximum length, two (2) or more separate ladders shall be used, offset with a platform between each ladder. Guardrails and toeboards shall be erected on exposed sides of the platforms:~~

~~————— (4) The width of single cleat ladders shall be at least fifteen (15) inches, but not more than twenty (20) inches, between rails at the top:~~

~~————— (5) Side rails shall be parallel or flared top to bottom by not more than one-quarter (1/4) of an inch for each two (2) feet of length:~~

~~————— (6) Wood side rails of ladders having cleats shall be not less than one and one-half (1- 1/2) inches thick and three and one-half (3-1/2) inches deep (two (2) inches x four (4) inches nominal) when made of Group 2 or Group 3 woods (see Table 27) may be used in the same cross-section of dimensions for cleat ladders up to twenty (20) feet in length:~~

~~————— (7) It is preferable that side rails be continuous. If splicing is necessary to attain the required length, however, the splice must develop the full strength of a continuous side rail of the same length.~~

~~————— (8) Two (2) inch x four (4) inch lumber shall be used for side rails of single cleat ladders up to sixteen (16) feet long, three (3) inch x six (6) inch lumber shall be used for single cleat ladders from sixteen (16) to thirty (30) feet in length.~~

~~————— (9) Two (2) inch x four (4) inch lumber shall be used for side and middle rails of double cleat ladders up to twelve (12) feet in length, two (2) inch x six (6) inch lumber for double cleat ladders from twelve (12) to twenty-four (24) feet in length.~~

~~————— (10) Wood cleats shall have the following minimum dimensions when made of Group 1 woods, (see Table 28):~~

~~————— (11) Cleats may be made of species of any other group of wood (see Table 27) provided equal or greater strength is maintained.~~

~~————— (12) Cleats shall be inset into the edges of the side rails one-half (1/2) inch, or filler blocks shall be used on the rails between the cleats. The cleats shall be secured to each rail with three (3) ten (10)d common wire nails or other fasteners of equivalent strength. Cleats shall be uniformly spaced, twelve (12) inches top-to-top.~~

### 33.2. Scaffolding:

~~————— (a) General requirements:~~

~~————— (1) Scaffolds shall be erected in accordance with requirements of this Section. All scaffolding shall be inspected prior to each use and scaffolding found defective of improper type or not properly constructed will not be used until corrected. Scaffolding shall be inspected for dry rot, cracks or other defects prior to construction of a scaffold. Scaffold planks shall be inspected as to the above mentioned. Defective planks shall be removed from service.~~

~~————— (2) The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks, shall not be used to support scaffolds or planks.~~

~~————— (3) No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons:~~

~~————— (4) Guardrails and toeboards shall be installed on all open sides and ends of platforms more than ten (10) feet above the ground or floor, except needle beam scaffolds and floats. Scaffolds four (4) feet to ten (10) feet in height, having a minimum horizontal dimension in either direction of less than forty-five (45) inches, shall have standard guardrails installed on all open sides and ends of the platform.~~

~~————— (5) Guardrails shall be two (2) inches x four (4) inches, or the equivalent, approximately forty-two (42) inches high, with a mid-rail, when required. Supports shall be at intervals not to exceed eight (8) feet. Toeboards shall be a minimum of four (4) inches in height.~~

~~————— (6) Where persons are required to work or pass under the scaffold, scaffolds shall be provided with a screen between the toeboard and the guardrail, extending along the entire opening,~~

consisting of the No. 18 gauge wire, one and one-half (1-1/2) inch mesh, or the equivalent.

~~————— (7) Scaffolds and their components shall be capable of supporting without failure at least four (4) times the maximum intended load.~~

~~————— (8) Any scaffold including accessories such as braces, brackets, trusses, screw legs, ladders, etc., damaged or weakened from any cause shall be immediately repaired or replaced.~~

~~————— (9) All load-carrying timber members of scaffold framing shall be a minimum of one thousand five hundred (1,500) fiber construction grade lumber. All dimensions are nominal sizes, except that where rough sizes are noted, only rough or undressed lumber of the size specified will satisfy minimum requirements.~~

~~————— (10) All planking shall be scaffold grades, or equivalent, as recognized by approved grading rules for the species of wood used. The maximum permissible spans for two (2-) x ten (10-) inch or wider planks shall be as shown in Table 29:~~

~~————— (11) The maximum permissible span for one and one-quarter (1-1/4) inch x nine (9) inch or wider plank of full thickness shall be four (4) feet with medium duty loading of fifty (50) p.s.f.~~

~~————— (12) All planking or platforms shall be overlapped (minimum twelve (12) inches) or secured from movement.~~

~~————— (13) An access ladder or equivalent safe access shall be provided.~~

~~————— (14) Scaffold planks shall extend over their end supports not less than six (6) inches nor more than twelve (12) inches.~~

~~————— (15) The poles, legs, or uprights of scaffolds shall be plumb and securely and rigidly braced to prevent swaying and displacement.~~

~~————— (16) Overhead protection shall be provided for men on a scaffold exposed to overhead hazards.~~

~~————— (17) Slippery conditions on scaffolds shall be eliminated as soon as possible after they occur.~~

~~————— (18) No welding, burning, riveting, or open flame work shall be performed on any staging suspended means of fiber or synthetic rope. Only treated or protected fiber or synthetic ropes shall be used for or near any work involving the use of corrosive substances or chemicals.~~

~~————— (19) Wire, synthetic, or fiber rope used for scaffold suspension shall be capable of supporting at least six (6) times the rated load.~~

~~————— (20) The use of shore or lean-to scaffolds is prohibited.~~

~~————— (21) Lumber sizes, when used in this subpart, refer to nominal sizes except where otherwise stated.~~

(b) Wood pole scaffolds:

~~————— (1) Scaffold poles shall bear on a foundation of sufficient size and strength to spread the load from the pole over a sufficient area to prevent settlement. All poles shall be set plumb.~~

~~————— (2) Where wood poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section. Wood splice plates shall be provided on at least two (2) adjacent sides and shall be not less than four (4) feet in length, overlapping the abutted ends equally, and have the same width and not less than the cross sectional area of the pole. Splice plates or other materials of equivalent strength may be used.~~

~~————— (3) Independent pole scaffolds shall be set as near to the wall of the building as practicable.~~

~~————— (4) All pole scaffolds shall be securely guyed or tied to the building or structure. Where the height or length exceeds twenty-five (25) feet, the scaffold shall be secured at intervals not greater than twenty-five (25) feet vertically and horizontally.~~

~~————— (5) Putlogs or bearers shall be set with their greater dimension vertical, long enough to project over the ledgers of the inner and outer rows of poles at least three (3) inches for proper support.~~

~~————— (6) Every wooden putlog on single pole scaffolds shall be reinforced with three-sixteenths (3/16) inch x two (2) inch steel strip, or equivalent, secured to its lower edge throughout its entire length.~~

~~————— (7) Ledgers shall be long enough to extend over two (2) pole spaces. Ledgers shall not be spliced between the poles. Ledgers shall be reinforced by bearing blocks securely nailed to the side of the pole to form a support for the ledger.~~

~~————— (8) Diagonal bracing shall be provided to prevent the poles from moving in a direction parallel with the wall of the building, or from buckling.~~

~~————— (9) Cross bracing shall be provided between the inner and outer sets of poles in independent pole scaffolds. The free ends of pole scaffolds shall be cross braced.~~

~~————— (10) Full diagonal face bracing shall be erected across the entire face of pole scaffolds in both directions. The braces shall be spliced at the poles. The inner row of poles on medium and heavy duty scaffolds shall be braced in a similar manner.~~

~~————— (11) Platform plank shall be laid with their edges close together so the platform will be tight with no spaces through which tools or fragments of material can fall.~~

~~————— (12) Where planking is lapped, each plank shall lap its end supports at least twelve (12) inches. Where the ends of planks abut each other to form a flush floor, the butt joint shall be at the centerline of a pole. The abutted ends shall rest on separate bearers. Intermediate beams shall be provided where necessary to prevent dislodgement of planks due to deflection, and the ends shall be secured to prevent their dislodgement.~~

~~————— (13) When a scaffold materially changes its direction, the platform planks shall be laid to prevent tipping. The planks that meet the corner putlog at an angle shall be laid first, extending over the diagonally placed putlog far enough to have a good safe bearing, but not far enough to involve any danger from tipping. The planking running in the opposite direction at an angle shall be laid so as to extend over and rest on the first layer of planking.~~

~~————— (14) When moving platforms to the next level, the old platform shall be left undisturbed until the new putlogs or bearers have been set in place, ready to receive the platform planks:~~

~~————— (15) Guardrails made of lumber not less than two (2) inches x four (4) inches (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section, when required:~~

~~————— (16) All wood pole scaffolds sixty (60) feet or less in height shall be constructed and erected in accordance with Table 30 through 36. If they are over sixty (60) feet in height, they shall be designed by a qualified engineer competent in this field, and it shall be constructed and erected in accordance with such design:~~

~~(c) Tube and coupler scaffolds:~~

~~————— (1) A light duty tube and coupler scaffold shall have all posts, bearers, runners, and bracing of nominal two (2) inch OD steel tubing. The posts shall be spaced no more than six (6) feet apart by ten (10) feet along the length of the scaffold. Other structural metals when used must be designed to carry an equivalent load. No dissimilar metals shall be used together:~~

~~————— (2) A medium duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal two (2) inch OD steel tubing. Posts spaced not more than five (5) feet apart by eight (8) feet along the length of the scaffold shall have bearers of nominal two (2) inch OD steel tubing:~~

~~————— Other structural metals, when used, must be designed to carry an equivalent load. No dissimilar metals shall be used together:~~

~~————— (3) A heavy duty tube and coupler scaffold shall have all posts, runners, and bracing of nominal two (2) inch OD steel tubing, with the posts spaced not more than six (6) feet x six (6) feet six (6) inches. Other structural metals, when used, must be designed to carry an equivalent load. No dissimilar metals shall be used together:~~

~~————— (4) Tube and coupler scaffolds shall be limited in heights and working levels to those permitted in Tables 36, 37 and 38. Drawings and specifications of all tube and coupler scaffolds above the limitations in Tables 36, 37 and 38 shall be designed by a qualified engineer competent in this field:~~

~~————— (5) All tube and coupler scaffolds shall be constructed and erected to support four (4) times the maximum intended loads, as set forth in Tables 36, 37 and 38, or as set forth in the specifications by a licensed professional engineer competent in this field:~~

~~————— (6) Posts shall be accurately spaced, erected on suitable bases, and maintained plumb:~~

~~————— (7) Runners shall be erected along the length of the scaffold, located on both the inside and the outside posts, at even height. Runners shall be interlocked to form continuous lengths and coupled to each post. The bottom runners shall be located as close to the base as possible. Runners shall be placed not more than six (6) feet six (6) inches on centers:~~

~~————— (8) Bearers shall be installed transversely between posts and shall be securely coupled to the~~

~~posts bearing on the runner coupler. When coupled directly to the runners, the coupler must be kept as close to the posts as possible.~~

~~————— (9) Bearers shall be at least four (4) inches but not more than twelve (12) inches longer than the post spacing or runner spacing.~~

~~————— (10) Cross bracing shall be installed across the width of the scaffold at least every third set of posts horizontally and every fourth runner vertically. Such bracing shall extend diagonally from the inner and outer runners upward to the next outer and inner runners.~~

~~————— (11) Longitudinal diagonal bracing on the inner and outer rows of poles shall be installed at approximately a forty-five (45) degree angle from near the base of the first outer post upward to the extreme top of the scaffold. Where the longitudinal length of the scaffold permits, such bracing shall be duplicated beginning at every fifth post. In a similar manner, longitudinal diagonal bracing shall also be installed from the last post extending back and upward toward the first post. Where conditions preclude the attachment of this bracing to the posts, it may be attached to the runners.~~

~~————— (12) The entire scaffold shall be tied to and securely braced against the building at intervals not to exceed thirty (30) feet horizontally and twenty-six (26) feet vertically.~~

~~————— (13) Guardrails made of lumber, not less than two (2) inches x four (4) inches (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

~~(d) Tubular welded frame scaffolds:~~

~~————— (1) Metal tubular frame scaffolds including accessories such as braces, brackets, trusses, screw legs, ladders, etc., shall be designed, constructed, and erected to safely support four (4) times the maximum rated load.~~

~~————— (2) Spacing of panels or frames shall be consistent with the loads imposed.~~

~~————— (3) Scaffolds shall be properly braced by cross bracing or diagonal braces, or both, for securing vertical members together laterally, and the cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections shall be made secure.~~

~~————— (4) Scaffold legs shall be set on adjustable bases or plain bases placed on mud sills or other foundations adequate to support the maximum rated load.~~

~~————— (5) The frames shall be placed one (1) on top of the other with coupling or stacking pins to provide proper vertical alignment of the legs.~~

~~————— (6) Where uplift may occur, panels shall be locked together vertically by pins or other equivalent suitable means.~~

~~————— (7) To prevent movement, the scaffold shall be secured to the building or structure at~~

intervals not to exceed thirty (30) feet horizontally and twenty-six (26) feet vertically.

~~————— (8) Maximum permissible spans or planking shall be in conformity with paragraph (a)(10) of this section.~~

~~————— (9) Drawings and specifications for all frame scaffolds over one hundred twenty-five (125) feet in height above the base plates shall be designed by a registered professional engineer.~~

~~————— (10) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), and approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

~~(e) Manually propelled mobile scaffolds.~~

~~————— (1) When free-standing mobile scaffold towers are used, the height shall not exceed four (4) times the minimum base dimension.~~

~~————— (2) Casters shall be properly designed for strength and dimensions to support four (4) times the maximum intended load. All casters shall be provided with a positive locking device to hold the scaffold in position.~~

~~————— (3) Scaffolds shall be properly braced by cross bracing and horizontal bracing conforming with paragraph (d)(3) of this section.~~

~~————— (4) Platforms shall be tightly planked for the full width of the scaffold except for necessary entrance opening. Platforms shall be secured in place.~~

~~————— (5) A ladder or stairway shall be provided for proper access and exit and shall be affixed or built into the scaffold and so located that when in use it will not have a tendency to tip the scaffold. A landing platform must be provided at intervals not to exceed thirty-five (35) feet.~~

~~————— (6) The force necessary to move the mobile scaffold shall be applied near or as close to the base as practicable and provision shall be made to stabilize the tower during movement from one (1) location to another. Scaffolds shall only be moved on level floors, free of obstructions and openings.~~

~~————— (7) The employer shall not allow employees to ride on manually propelled scaffolds unless the following conditions exist:~~

~~————— (i) The floor or surface is within three (3) degrees of level and free from pits, holes, or obstructions;~~

~~————— (ii) The minimum dimension of the scaffold base when ready for rolling is at least one-half (1/2) the height. Outriggers, if used, shall be installed on both sides of staging;~~

~~————— (iii) The wheels are equipped with rubber or similar resilient tires;~~

~~————— (iv) All tools and materials are secured or removed from the platform before the mobile~~

scaffold is moved.

~~(8) Scaffolds in use by any person shall rest upon a suitable footing and shall stand plumb. The casters or wheels shall be locked to prevent any movement.~~

~~(9) Mobile scaffolds constructed of metal members shall also conform to applicable provisions of paragraphs (b), (c), or (d) of this section, depending on the material of which they are constructed.~~

~~(10) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

(f) Outrigger scaffolds:

~~(1) Outrigger beams shall extend not more than six (6) feet beyond the face of the building. The inboard end of outrigger beams, measured from the fulcrum point to anchorage point, shall be not less than one and one-half (1-1/2) times the outboard end in length. The beams shall rest on edge, the sides shall be plumb, and the edges shall be horizontal. The fulcrum point of the beam shall rest on a secure bearing at least six (6) inches in each horizontal dimension. The beam shall be secured in place against movement and shall be securely braced at the fulcrum point against tipping.~~

~~(2) The inboard ends of outrigger beams shall be securely anchored either by means of struts bearing against sills in contact with the overhead beams or ceiling, or by means of tension members secured to the floor joints underfoot, or by both if necessary. The inboard ends of outrigger beams shall be secured against tipping and the entire supporting structure shall be securely braced in both directions to prevent any horizontal movement.~~

~~(3) Unless outrigger scaffolds are designed by a registered professional engineer competent in this field, they shall be constructed and erected in accordance with Table 39. Outrigger scaffolds, designed by a registered professional engineer, shall be constructed and erected in accordance with such design.~~

~~(4) Planking shall be laid tight and shall extend to within three (3) inches of the building wall. Planking shall be secured to the beams.~~

~~(5) Guardrails of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

(h) Masons' adjustable multiple-point suspension scaffolds:

~~(1) The scaffold shall be capable of sustaining a working load of fifty (50) pounds per square foot and shall not be loaded in excess of that figure.~~

~~————— (2) The scaffold shall be provided with hoisting machines that meet the requirements of Underwriters Laboratories of Factory Mutual Engineering Corporation.~~

~~————— (3) The platform shall be supported by wire ropes, capable of supporting at least six (6) times the intended load, suspended from overhead outrigger beams.~~

~~————— (4) The scaffold outrigger beams shall consist of structural metal securely fastened or anchored to the frame or floor system of the building or structure.~~

~~————— (5) Each outrigger beam shall be equivalent in strength to at least a standard seven (7) inch, fifteen and three tenths (15.3) lb. steel I-beam, at least fifteen (15) feet long, and shall not project more than six (6) feet six (6) inches beyond the bearing point.~~

~~————— (6) Where the overhand exceeds six (6) feet six (6) inches, outrigger beams shall be composed of stronger beams or multiple beams and be installed under the supervision of a competent person.~~

~~————— (7) All outrigger beams shall be set and maintained with their webs in a vertical position.~~

~~————— (8) A stop bolt shall be placed at each end of every outrigger beam.~~

~~————— (9) The outrigger beam shall rest on suitable wood bearing blocks.~~

~~————— (10) The free end of the suspension wire ropes shall be equipped with proper size thimbles and secured by splicing or other equivalent means. The running ends shall be securely attached to the hoisting drum and at least four (4) turns of wire rope shall at all times remain on the drum. The use of fiber rope is prohibited.~~

~~————— (11) Where a single outrigger beam is used, the steel shackles or clevises with which the wire ropes are attached to the outrigger beams shall be placed directly over the hoisting drums.~~

~~————— (12) The scaffold platform shall be equivalent in strength to at least two (2) inches planking. (For maximum planking spans, see paragraph (a)(11) of this section.)~~

~~————— (13) When employees are at work on the scaffold and an overhead hazard exists, overhead protection shall be provided on the scaffold, not more than nine (9) feet above the platform, consisting of two (2) inch planking, or material of equivalent strength, laid tight, and extending not less than the width of the scaffold.~~

~~————— (14) Each scaffold shall be installed or relocated under the supervision of a competent person.~~

~~————— (15) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail ), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

~~(i) (Swinging scaffolds) Two (2) point suspension:~~

~~————— (1) Two (2) point suspension scaffold platforms shall be not less than twenty (20) inches nor more than thirty-six (36) inches wide overall. The platform shall be securely fastened to the hangers by U-bolts or by other equivalent means.~~

~~————— (2) The hangers of two (2) point suspension scaffolds shall be made of mild steel, or other equivalent materials, having a cross-sectional area capable of sustaining four (4) times the maximum rated load, and shall be designed with a support for guardrail, intermediate rail, and toeboard.~~

~~————— (3) When hoisting machines are used on two (2) point suspension scaffolds, such machines shall be of a design tested and approved by Underwriters Laboratories of Factory Mutual Engineering Corporation.~~

~~————— (4) The roof irons or hooks shall be of mild steel, or other equivalent material, of proper size and design, securely installed and anchored. Tiebacks of three-quarter (3/4) inch manila rope, or the equivalent, shall serve as a secondary means of anchorage, installed at right angles to the face of the building, whenever possible, and secured to a structurally sound portion of the building.~~

~~————— (5) Two-point suspension scaffolds shall be suspended by wire, synthetic or fiber ropes capable of supporting at least six (6) times the rated load. All other components shall be capable of supporting at least four (4) times the rated load.~~

~~————— (6) The sheaves of all blocks, consisting of at least one (1) double and one (1) single block, shall fit the size and type of rope used.~~

~~————— (7) All wire ropes, fiber and synthetic ropes, slings, hangers, platforms, and other supporting parts shall be inspected before every installation. Periodic inspections shall be made while the scaffold is in use.~~

~~————— (8) On suspension scaffolds designed for a working load of five hundred (500) pounds, no more than two (2) men shall be permitted to work at one time. On suspension scaffolds with a working load of seven hundred fifty (750) pounds, no more than three (3) men shall be permitted to work at one time. Each employee shall be protected by an approved safety life belt attached to a lifeline. The lifeline shall be securely attached to substantial members of the structure (not scaffold), or to securely rigged lines which will safely suspend the employee in case of a fall. In order to keep the lifeline continuously attached, with a minimum of slack, to a fixed structure, the attachment point of the lifeline shall be appropriately changed as the work progresses.~~

~~————— (9) Two (2) point suspension scaffolds shall be securely lashed to the building or structure to prevent them from swaying. Window cleaners' anchors shall not be used for this purpose.~~

~~————— (10) The platform of every two (2) point suspension scaffold shall be one of the following types:~~

~~————— (i) Ladder-type platforms. The side stringer shall be of clear straight-grained spruce or materials of equivalent strength and durability. The rungs shall be of straight-grained oak, ash, or hickory, at least one and one-eighth (1-1/8) inch in diameter, with seven-eighths (7/8) inch. The stringers shall be tied together with tie rods not less than one-quarter (1/4) inch in diameter, passing through the stringers and riveted up tight against washers on both ends. The flooring strips shall be spaced not more than five-eighths (5/8) inch apart except at the side rails where the space may be one (1) inch. Ladder-type platforms shall be constructed in accordance with Table 40:~~

~~————— (ii) Plank-type platforms. Plank-type platforms shall be composed of not less than nominal two (2) inch x ten (10) inch unspliced planks, properly cleated together on the underside, starting six (6) inches from each end; intervals in between shall not exceed four (4) feet. The plank-type platform shall not extend beyond the hangers more than twelve (12) inches. A bar or other effective means shall be securely fastened to the platform at each end to prevent its slipping off the hanger. The span between hangers for plank-type platforms shall not exceed eight (8) feet.~~

~~————— (iii) Beam-type platforms. Beam platforms shall have side stringers of lumber not less than two (2) inch x six (6) inch set on edge. The span between hangers shall not exceed twelve (12) feet when beam platforms are used. The flooring shall be supported on two (2) inch x six (6) inch cross beams, laid flat and set into the upper edge of the stringers with a snug fit, at intervals of not more than four (4) feet, securely nailed in place. The flooring shall be of one (2) inch x six (6) inch material properly nailed. Floor boards shall not be spaced more than one-half (1/2) inch apart.~~

~~————— (iv) Light metal-type platforms, when used, shall be tested and listed according to Underwriters Laboratories of Factory Mutual Engineering Corporation.~~

~~————— (11) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail, and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

~~(j) Stone setters' adjustable multiple-point suspension scaffolds:~~

~~————— (1) The scaffold shall be capable of sustaining a working load of twenty-five (25) pounds per square foot and shall not be used for storage of stone or other heavy materials.~~

~~————— (2) When used, the hoisting machine and its supports shall be of a type tested and listed by Underwriters Laboratories of Factory Mutual Engineering Corporation.~~

~~————— (3) The platform shall be securely fastened to the hangers of U-bolts or other equivalent means. (For materials and spans, see subdivision (ii) of paragraph (i)(10), plank-type platforms, and Table 40 of this Section.)~~

~~————— (4) The scaffold unit shall be suspended from metal outriggers, from brackets, wire rope slings, or iron hooks.~~

~~————— (5) Outriggers, when used, shall be set with their webs in a vertical position, securely anchored to the building or structure and provided with stop bolts at each end.~~

~~————— (6) The scaffold shall be supported by wire rope capable of supporting at least six (6) times the rated load. All other components shall be capable of supporting at least four (4) times the rated load.~~

~~————— (7) The free ends of the suspension wire ropes shall be equipped with proper size thimbles, secured by splicing or other equivalent means. The running ends shall be securely attached to the hoisting drum and at least four (4) turns of wire rope shall remain at the drum at all times.~~

~~————— (8) When two (2) or more scaffolds are used on a building or structure, they shall not be~~

bridged one to the other, but shall be maintained at even height with the platforms abutting closely.

~~(9) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail, and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

(k) Single-point adjustable suspension scaffolds:

~~(1) The scaffolding, including power units or manually operated winches, shall be of a type tested and listed by Underwriters Laboratories of Factory Mutual Engineering Corporation.~~

~~(2) The power units may be either electrically or air motor driven.~~

~~(3) All power-operated gears and brakes shall be enclosed.~~

~~(4) In addition to the normal operating brake, all power-driven units shall have an emergency brake which engages automatically when the normal speed of descent is exceeded.~~

~~(5) The hoisting machines, cables, and equipment shall be regularly serviced and inspected.~~

~~(6) The units may be combined to form a two (2) point suspension scaffold. Such scaffold shall then comply with paragraph (i) of this section.~~

~~(7) The supporting cable shall be vertical for its entire length, and the basket shall not be swayed nor the cable fixed to any intermediate points to change the original path of travel.~~

~~(8) Suspension methods shall conform to applicable provisions of paragraphs (h) and (i) of this section.~~

~~(9) Guards, midrails, and toeboards shall completely enclose the cage or basket. Guardrails shall be no less than two (2) inch x four (4) inch or the equivalent, approximately forty-two (42) inches above the platform. Midrails shall be one (1) inch x six (6) inch or the equivalent, installed equidistant between the guardrail and platform. Toeboards shall be a minimum of four (4) inches in height.~~

~~(10) For additional details not covered in this paragraph, applicable technical portions of American National Standards Institute A120.1-1970, Power Operated Devices for Exterior Building Maintenance Powered Platforms, shall be used.~~

(l) Boatswain's chairs:

~~(1) The chair seat shall not be less than twelve (12) inch x twenty-four (24) inch, and one (1) inch thickness. The seat shall be reinforced on the underside by cleats securely fastened to prevent the board from splitting.~~

~~(2) The two (2) fiber rope seat slings shall be of five-eighths (5/8) inch diameter, reeved through the four (4) seat holes so as to cross each other on the underside of the seat.~~

~~(3) Seat slings shall be of at least three-eighths (3/8) inch wire rope when an employee is~~

~~conducting a heat-producing process, such as gas or arc welding.~~

~~————— (4) The employee shall be protected by a safety belt and lifeline. The attachment point of the lifeline to the structure shall be appropriately changed as the work progresses.~~

~~————— (5) The tackle shall consist of correct size ball bearing or brushed blocks and properly spliced five-eighths (5/8) inch diameter first-grade manila rope, or equivalent.~~

~~————— (6) The roof irons, hoods, or the object to which the tackle is anchored, shall be securely installed. Tiebacks, when used, shall be installed at right angles to the face of the building and securely fastened.~~

~~(m) Carpenters' bracket scaffolds.~~

~~————— (1) The brackets shall consist of a triangular wood frame not less than two (2) inch x three (3) inch in cross section or of metal of equivalent strength. Each member shall be properly fitted and securely joined.~~

~~————— (2) Each bracket shall be attached to the structure by means of one (1) of the following:~~

~~————— (i) A bolt, no less than five-eighths (5/8) inches in diameter, which shall extend through to the inside of the building wall;~~

~~————— (ii) A metal stud attachment device;~~

~~————— (iii) Welding to steel tanks;~~

~~————— (iv) Hooking over a well-secured and adequately strong supporting member.~~

~~————— (3) The brackets shall be spaced no more than eight (8) feet apart.~~

~~————— (4) No more than two (2) employees shall occupy any given eight (8) feet of a bracket scaffold at any time. Tools and materials shall not exceed seventy-five (75) pounds in addition to the occupancy.~~

~~————— (5) The platform shall consist of not less than two (2) inch x ten (10) inch nominal size planks extending not more than twelve (12) inches or less than six (6) inches beyond each end support.~~

~~————— (6) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends of all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section.~~

~~(n) Bricklayers' square scaffolds.~~

~~————— (1) The square shall not exceed five (5) feet in width and five (5) feet in height.~~

~~————— (2) Members shall be not less than those specified in Table 41.~~

~~————— (3) The squares shall be reinforced on both sides of each corner with one (1) inch x six (6) inch gusset pieces. They shall also have diagonal braces one (1) inch x eight (8) inch on both sides running from center to center of each member, or other means to secure equivalent strength and rigidity.~~

~~————— (4) The squares shall be set not more than five (5) feet apart for medium duty scaffolds, and not more than eight (8) feet apart for light duty scaffolds. Bracing, one (1) inch x eight (8) inch, extending from the bottom of each square to the top of the next square, shall be provided on both front and rear sides of the scaffold.~~

~~————— (5) Platform planks shall be at least two (2) inch x ten (10) inch nominal size. The ends of the planks shall overlap the bearers of the squares and each plank shall be supported by not less than three (3) squares.~~

~~————— (6) Bricklayers' square scaffolds shall not exceed three (3) tiers in height and shall be so constructed and arranged that one (1) square shall rest directly above the other. The upper tiers shall stand on a continuous row of planks laid across the next lower tier and be nailed down or otherwise secured to prevent displacement.~~

~~————— (7) Scaffolds shall be level and set upon a firm foundation.~~

~~(o) Horse scaffolds:~~

~~————— (1) Horse scaffolds shall not be constructed or arranged more than two (2) tiers or ten (10) feet in height.~~

~~————— (2) The members of the horses shall be not less than those specified in Table 42.~~

~~————— (3) Horses shall be spaced not more than five (5) feet for medium duty and not more than eight (8) feet for light duty.~~

~~————— (4) When arranged in tiers, each horse shall be placed directly over the horse in the tier below.~~

~~————— (5) On all scaffolds arranged in tiers, the legs shall be nailed down or otherwise secured to the planks to prevent displacement or thrust and each tier shall be substantially cross braced.~~

~~————— (6) Horses or parts which have become weak or defective shall not be used.~~

~~————— (7) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this section when required.~~

~~(p) Needle beam scaffold:~~

~~————— (1) Wood needle beams shall be not less than four (4) inch x five (5) inch in size, with the greater dimension placed in a vertical direction. Metal beams or the equivalent, conforming to~~

~~paragraphs (a)(8) and (10) of this section, may be used and shall not be altered or moved horizontally while they are in use:~~

~~(2) Ropes or hangers shall be provided for supports. The span between supports on the needle beam shall not exceed ten (10) feet for four (4) inch x six (6) inch timbers. Rope supports shall be equivalent in strength to one (1) inch diameter first-grade manila rope.~~

~~(3) The ropes shall be attached to the needle beams by a scaffold hitch or a properly made eye splice. The loose end of the rope shall be tied by a bowline knot or by a round turn and a half hitch.~~

~~(4) The scaffold hitch shall be arranged so as to prevent the needle beam from rolling or becoming otherwise displaced.~~

~~(5) The platform span between the needle beams shall not exceed eight (8) feet when using two (2) inch scaffold plank. For spans greater than eight (8) feet, platforms shall be designed based on design requirements for the special span. The overhang of each end of the platform planks shall be not less than six (6) inches and not more than twelve (12) inches.~~

~~(6) When needle beam scaffolds are used, the planks shall be secured against slipping.~~

~~(7) All unattached tools, bolts, and nuts used on needle beam scaffolds shall be kept in suitable containers, properly secured.~~

~~(8) One (1) end of a needle beam scaffold may be supported by a permanent structural member conforming to paragraphs (a)(8) and (10) of this Section.~~

~~(9) Each employee working on a needle beam scaffold shall be protected by a safety belt and lifeline.~~

~~(q) Plasterers', decorators', and large area scaffolds:~~

~~(1) Plasterers', lathers', and ceiling workers' inside scaffolds shall be constructed in accordance with the general requirements set forth for independent wood pole scaffolds. (See paragraph (b) and Tables 33, 34 and 39 of this Section.)~~

~~(2) All platform planks shall be laid with the edges close together.~~

~~(3) When independent pole scaffold platforms are erected in sections, such sections shall be provided with connecting runways equipped with substantial guardrails.~~

~~(4) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed on all open sides and ends of all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this Section.~~

~~(r) Interior hung scaffolds:~~

~~(1) An interior hung scaffold shall be hung or suspended from the roof structure or ceiling~~

beams:

~~————— (2) The suspending wire or fiber rope shall be capable of supporting at least six (6) times the rated load. The rope shall be wrapped at least twice around the supporting members and twice around the bearers of the scaffold, with each end of the wire rope secured by at least three (3) standard wire-rope clips properly installed.~~

~~————— (3) For hanging wood scaffolds, the following minimum nominal size material shall be used:~~

~~————— (i) Supporting bearers two (2) inch x ten (10) inch on edge;~~

~~————— (ii) Planking two (2) inch x ten (10) inch, with maximum span seven (7) feet for heavy duty and ten (10) feet for light duty or medium duty.~~

~~————— (4) Steel tube and coupler members may be used for hanging scaffolds with both types of scaffold designed to sustain a uniform distributed working load up to heavy duty scaffold loads with a safety factor of four (4):~~

~~————— (5) Guardrails made of lumber, not less than two (2) inch x four (4) inch (or other material providing equivalent protection), approximately forty-two (42) inches high, with a midrail of one (1) inch x six (6) inch lumber (or other material providing equivalent protection), and toeboards shall be installed at all open sides and ends on all scaffolds more than ten (10) feet above the ground or floor. Toeboards shall be a minimum of four (4) inches in height. Wire mesh shall be installed in accordance with paragraph (a)(6) of this Section.~~

(s) Ladder jack scaffolds:

~~————— (1) All ladder jack scaffolds shall be limited to light duty and shall not exceed a height of twenty (20) feet above the floor or ground.~~

~~————— (2) All ladders used in connection with ladder jack scaffolds shall be heavy-duty ladders and shall be designed and constructed in accordance with American National Standards Institute A14.1-1968 Safety Code for Portable Wood Ladders, and A14.2-1968, Safety Code for Portable Metal Ladders. Cleated ladders shall not be used for this purpose.~~

~~————— (3) The ladder jack shall be so designed and constructed that it will bear on the side rails in addition to the ladder rungs, or if bearing on rungs only, the bearing area shall be at least ten (10) inches on each rung.~~

~~————— (4) Ladders used in conjunction with ladder jacks shall be so placed, fastened, held, or equipped with devices so as to prevent slipping.~~

~~————— (5) The wood platform planks shall be not less than two (2) inch nominal in thickness. Both metal and wood platform planks shall overlap the bearing surface not less than twelve (12) inches. The span between supports for wood shall not exceed eight (8) feet. Platform width shall be not less than eighteen (18) inches.~~

~~————— (6) Not more than two (2) employees shall occupy any given eight (8) feet of any ladder jack scaffold at any one (1) time.~~

~~(t) Window jack scaffolds:~~

~~————— (1) Window jack scaffolds shall be used only for the purpose of working at the window opening through which the jack is placed.~~

~~————— (2) Window jacks shall not be used to support planks placed between one (1) window jack and another or for other elements of scaffolding.~~

~~————— (3) Window jack scaffolds shall be provided with guardrails unless safety belts with lifelines are attached and provided for employee.~~

~~————— 4) Not more than one (1) employee shall occupy a window jack scaffold at any one (1) time.~~

~~(u) Roofing brackets:~~

~~————— (1) Roofing brackets shall be constructed to fit the pitch of the roof.~~

~~————— (2) Brackets shall be secured in place by nailing in addition to the pointed metal projections. When it is impractical to nail brackets, rope supports shall be used. When rope supports are used, they shall consist of first grade manila of at least three-quarter (3/4) inch diameter, or equivalent.~~

~~————— (3) A catch platform shall be installed below the working area of roofs more than sixteen (16) feet from the ground to eaves with a slope greater than four (4) inch in twelve (12) inch without a parapet. In width, the platform shall extend two (2) feet beyond the protection of the eaves and shall be provided with a guardrail, midrail, and toeboard. This provision shall not apply where employees engaged in work upon such roofs are protected by a safety belt attached to a lifeline.~~

~~(v) Crawling board or chicken ladders:~~

~~————— (1) Crawling board shall be not less than ten (10) inch wide and one (1) inch thick, having cleats one (1) inch x one and one-half (1-1/2) inch the Cleats shall be equal in length to the width of the board and spaced at equal intervals not to exceed twenty-four (24) inches. Nails shall be driven through and clinched on the underside. The crawling board shall extend from the ridge pole to the eaves when used in connection with roof construction, repair, or maintenance.~~

~~————— (2) A firmly fastened lifeline of at least three-quarter (3/4) inch diameter rope, or equivalent, shall be strung beside each crawling board for a handhold.~~

~~————— (3) Crawling boards shall be secured to the roof by means of adequate ridge hooks or other effective means.~~

~~(w) Form scaffolds:~~

~~————— (1) Form scaffolds shall be constructed of wood or other suitable materials, such as steel or aluminum members of known strength characteristics.~~

~~————— All scaffolds shall be designed and erected with a minimum safety factor of four (4), computed on the basis of the maximum rated load.~~

~~————— (2) All scaffold planking shall be a minimum of two (2) inch x ten (10) inch nominal scaffold~~

~~grade, as recognized and approved grading rules for the species of lumber used, or equivalent material. Maximum permissible spans shall not exceed eight (8) feet on centers for two (2) inch x ten (10) inch nominal planking. Scaffold planks shall be either nailed or bolted to the ledgers or of such length that they overlap the ledgers at least six (6) inches. Unsupported projecting ends of scaffolding planks shall be limited to a maximum overhang of twelve (12) inches.~~

~~————— (3) Scaffolds shall not be loaded in excess of the working load for which they were designed.~~

~~————— (4) Figure-four (4) form scaffolds:~~

~~————— (i) Figure-four (4) scaffolds are intended for light duty and shall not be used to support loads exceeding twenty-five (25) pounds per square foot unless specifically designed for heavier loading. For minimum design criteria, see Table 43.~~

~~————— (ii) Figure-four (4) form scaffold frames shall be spaced not more than eight (8) feet on centers and constructed from sound lumber, as follows:~~

~~————— The outrigger ledger shall consist of two (2) pieces of one (1) inch x six (6) inch or heavier material nailed on opposite sides of the vertical form support. Ledgers shall project not more than three (3) feet six (6) inches from the outside of the form support and shall be substantially braced and secured to prevent tipping or turning. The knee or angle brace shall intersect the ledger at least three (3) feet from the form at an angle of approximately forty-five degrees (45), and the lower end shall be nailed to a vertical support. The platform shall consist of two (2) or more two (2) inch x ten (10) inch planks, which shall be of such length that they extend at least six (6) inches beyond ledgers at each end unless secured to the ledgers. When planks are secured to the ledgers (nailed or bolted) a wood filler strip shall be used between the ledgers. Unsupported projecting ends of planks shall be limited to an overhang of twelve (12) inches.~~

~~————— (5) Metal bracket form scaffolds:~~

~~————— (i) Metal brackets or scaffold jacks which are an integral part of the form shall be securely bolted or welded to the form. Folding type brackets shall be either bolted or secured with a locking-type pin when extended for use.~~

~~————— (ii) "Clip-On" or "Hook-Over" brackets may be used, provided the form walers are bolted to the form or secured by snap ties or shea-volt extending through the form and securely anchored.~~

~~————— (iii) Metal brackets shall be spaced not more than eight (8) feet on centers.~~

~~————— (iv) Scaffold planks shall be either bolted to the metal brackets or of such length that they overlap the brackets at each end by at least six (6) inches.~~

~~————— Unsupported projecting ends of scaffold planks shall be limited to a maximum overhang of twelve (12) inches.~~

~~————— (v) Metal bracket form scaffolds shall be equipped with wood guardrails, intermediate rails, toeboards, and scaffold planks meeting the minimum dimensions shown in Table 44. (Metal may be substituted for wood, providing it affords equivalent or greater design strength.)~~

~~————— (6) Wooden bracket form scaffolds:~~

~~\_\_\_\_\_ (i) Wooden bracket form scaffolds shall be an integral part of the form panel. The minimum design criteria set forth herein and in Table 45 cover scaffolding intended for light duty and shall not be used to support loads exceeding twenty-five (25) pounds per square foot, unless specifically designed for heavier loading.~~

~~\_\_\_\_\_ (ii) Scaffold planks shall be either nailed or bolted to the ledgers or of such length that they overlap the ledgers at each end by at least six (6) inches. Unsupported projecting ends of scaffold planks shall be limited to a maximum overhang of twelve (12) inches.~~

~~\_\_\_\_\_ (iii) Guardrails and toeboards shall be installed on all open sides and ends of platforms and scaffolding over ten (10) feet above the floor or ground.~~

~~\_\_\_\_\_ Guardrails shall be made of lumber two (2) inch x four (4) inch nominal dimension (or other material providing equivalent protection), approximately forty-two (42) inches high, supported at intervals not to exceed eight (8) feet. Guardrails shall be equipped with midrails constructed of one (1) inch x six (6) inch nominal lumber (or other material providing equivalent protection). Toeboard shall extend not less than four (4) inches above the scaffold plank.~~

~~(x) Pump jack scaffolds:~~

~~\_\_\_\_\_ (1) Pump jack scaffolds shall:~~

~~\_\_\_\_\_ (i) Not carry a working load exceeding five hundred (500) pounds; and~~

~~\_\_\_\_\_ (ii) Be capable of supporting without failure at least four (4) times the maximum load.~~

~~\_\_\_\_\_ (iii) The manufacture components shall not be loaded in excess of the manufacturer's recommended limits.~~

~~\_\_\_\_\_ (2) Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles. Each pump jack bracket shall have two (2) positive gripping mechanisms to prevent any failure or slippage.~~

~~\_\_\_\_\_ (3) The platform bracket shall be fully decked and the planking secured. Planking, or equivalent, shall conform with paragraph (a) of this Section.~~

~~\_\_\_\_\_ (4)~~

~~\_\_\_\_\_ (i) When wood scaffold planks are used as platforms, poles used for pump jacks shall not be spaced more than ten (10) feet center to center. When fabricated platforms are used that fully comply with all other provisions of this paragraph (x), pole spacing may exceed ten (10) feet center to center.~~

~~\_\_\_\_\_ (ii) Poles shall not exceed thirty (30) feet in height.~~

~~\_\_\_\_\_ (iii) Poles shall be secured to the work wall by rigid triangular bracing, or equivalent, at the bottom, top, and other points as necessary to provide a maximum vertical spacing of not more than ten (10) feet between braces. Each brace shall be capable of supporting a minimum of two hundred twenty-five (225) pounds tension or compression.~~

~~————— (iv) For the pump jack bracket to pass bracing already installed, an extra brace shall be used approximately four (4) feet above the one (1) to be passed until the original brace is reinstalled:~~

~~————— (5) All poles shall bear on mud sills or other adequate firm foundations:~~

~~————— (6) Pole lumber shall be two (2) two (2) x fours (4), of Douglas Fir, or equivalent, straight-grained, clear, free of cross-grain, shakes, large loose or dead knots, and other defects which might impair strength:~~

~~————— (7) When poles are constructed of two (2) continuous lengths, they shall be two (2) by fours (4), spiked together with the seam parallel to the bracket, and with ten (10) common nails, no more than twelve (12) inches center to center, staggered uniformly from opposite outside edges:~~

~~————— (8) If two (2) by fours (4) are spliced to make up the pole, the splices shall be so constructed as to develop the full strength of the member:~~

~~————— (9) A ladder shall be provided for access to the platform during use:~~

~~————— (10) Not more than two (2) persons shall be permitted at one (1) time upon a pump jack scaffold between any two (2) supports:~~

~~————— (11) Pump jack scaffolds shall be provided with standard guardrails as defined in Section 32 of these regulations, but no guardrail is required when safety belts with lifelines are provided for employees:~~

~~————— (12) When a work bench is used at an approximate height of forty-two (42) inches, the top guardrail may be eliminated if the work bench is fully decked, the planking secured, and is capable of withstanding two hundred (200) pounds pressure in any direction:~~

~~————— (13) Employees shall not be permitted to use a work bench as a scaffold platform:~~

~~—— 33.3. Manually propelled mobile ladder stands and scaffolds (towers):~~

~~————— (a) General requirements:~~

~~————— (1) Application. This section is intended to prescribe rules and requirements for the design, construction, and use of mobile work platforms (including ladder stands but not including aerial ladders) and rolling (mobile) scaffolds (towers). This standard is promulgated to aid in providing for the safety of life, limb, and property, by establishing minimum standards for structural design requirements and for the use of mobile work platforms and towers:~~

~~————— (2) Working loads:~~

~~————— (i) Work platforms and scaffolds shall be capable of carrying the design load under varying circumstances depending upon the conditions of use. Therefore, all parts and appurtenances necessary for their safe and efficient utilization must be integral parts of the design:~~

~~————— (ii) Specific design and construction requirements are not a part of this section because of the wide variety of materials and design possibilities. However, the design shall be such as to produce a mobile ladder stand or scaffold that will safely sustain the specified loads. The material selected shall be of sufficient strength to meet the test requirements and shall be protected against corrosion or~~

deterioration:

~~\_\_\_\_\_ (A) The design working load of ladder stands shall be calculated on the basis of one (1) or more two hundred (200) pound persons with fifty (50) pounds of equipment each.~~

~~\_\_\_\_\_ (B) The design load of all scaffolds shall be calculated on the basis of:~~

~~\_\_\_\_\_ Light -- Designed and constructed to carry a working load of twenty-five (25) pounds per square foot.~~

~~\_\_\_\_\_ Medium -- Designed and constructed to carry a working load of fifty (50) pounds per square foot.~~

~~\_\_\_\_\_ Heavy -- Designed and constructed to carry a working load of seventy-five (75) pounds per square foot.~~

~~\_\_\_\_\_ All ladder stands and scaffolds shall be capable of supporting at least four (4) times the design working load.~~

~~\_\_\_\_\_ (iii) The materials used in mobile ladder stands and scaffolds shall be of standard manufacture and conform to standard specifications of strength, dimensions, and weights, and shall be selected to safely support the design working load.~~

~~\_\_\_\_\_ (iv) Nails, bolts, or other fasteners used in the construction of ladders, scaffolds, and towers shall be of adequate size and in sufficient numbers at each connection to develop the designed strength of the unit. Nails shall be driven full length. (All nails should be immediately withdrawn from dismantled lumber.)~~

~~\_\_\_\_\_ (v) All exposed surfaces shall be free from sharp edges, burrs or other safety hazards.~~

~~\_\_\_\_\_ (3) Work levels:~~

~~\_\_\_\_\_ (i) The maximum work level height shall not exceed four (4) times the minimum or least base dimensions of any mobile ladder stand or scaffold.~~

~~\_\_\_\_\_ Where the basic mobile unit does not meet this requirement, suitable outrigger frames shall be employed to achieve this least base dimension, or provisions shall be made to guy or brace the unit against tipping.~~

~~\_\_\_\_\_ (ii) The minimum platform width for any work level shall not be less than twenty (20) for mobile scaffolds (towers). Ladder stands shall have a minimum step width of sixteen (16) inches.~~

~~\_\_\_\_\_ (iii) The supporting structure for the work level shall be rigidly braced, using adequate cross bracing or diagonal bracing with rigid platforms at each work level.~~

~~\_\_\_\_\_ (iv) The steps of ladder stands shall be fabricated from slip resistant treads.~~

~~\_\_\_\_\_ (v) The work level platform of scaffolds (towers) shall be of wood, aluminum, or plywood planking, steel or expanded metal, for the full width of the scaffold, except for necessary openings. Work platforms shall be secured in place. All planking shall be two (2) inch (nominal) scaffold~~

~~grade minimum one thousand five hundred (1,500) feet (stress grade) construction grade lumber or equivalent:~~

~~(vi) All scaffold work levels ten (10) feet or higher above the ground or floor shall have a standard (four (4) inch nominal) toeboard:~~

~~(vii) All work levels ten (10) feet or higher above the ground or floor shall have a guardrail of two (2) inch x four (4) inch nominal or the equivalent installed no less than thirty-six (36) inches or more than forty-two (42) inches high, with a midrail, when required, of one (1) inch x four (4) inches nominal lumber or equivalent:~~

~~(viii) A climbing ladder or stairway shall be provided for proper access and egress, and shall be affixed or built into the scaffold and so located that its use will not have a tendency to tip the scaffold. A landing platform shall be provided at intervals not to exceed thirty (30) feet:~~

~~(4) Wheels or casters:~~

~~(i) Wheels or casters shall be properly designed for strength and dimensions to support four (4) times the design working load:~~

~~(ii) All scaffold casters shall be provided with a positive wheel and/or swivel lock to prevent movement. Ladder stands shall have at least two (2) of the four (4) casters and shall be of the seivel type:~~

~~(iii) Where leveling of the elevated work platform is required, screw jacks or other suitable means for adjusting the height shall be provided in the base section of each mobile unit:~~

~~(b) Mobile tubular welded sectional folding scaffolds:~~

~~(1) General. Units including sectional stairway and sectional ladder scaffolds shall be designed to comply with the requirements of paragraph (a) of this Section:~~

~~(2) Stairway. An integral set of pivoting and hinged folding diagonal and horizontal braces and a detachable work platform shall be incorporated into the structure of each sectional folding stairway scaffold:~~

~~(3) Bracing. An integral set of pivoting and hinged folding diagonal and horizontal braces and a detachable work platform shall be incorporated into the structure of each sectional folding ladder scaffold:~~

~~(4) Sectional folding stairway scaffolds. Sectional folding stairway scaffolds shall be designed as medium duty scaffolds except for high clearance:~~

~~These special base sections shall be designed as light duty scaffolds. When upper sectional folding stairway scaffolds are used with a special high clearance base, the load capacity of the entire scaffold shall be reduced accordingly. The width of a sectional folding stairway scaffold shall not exceed four and one-half (4-1/2) feet. The maximum length of a sectional folding stairway scaffold shall not exceed six (6) feet:~~

~~(5) Sectional folding ladder scaffolds. Sectional folding ladder scaffolds shall be designed as~~

~~light duty scaffolds including special base (open end) sections which are designed for high clearance. For certain special applications the six (6) foot long unit, eight (8) foot six (6) inch for an eight (8) foot unit or a ten (10) foot six (6) inch for a ten (10) foot long unit.~~

~~————— (6) End frames. The end frames of sectional ladder and stairway scaffolds shall be designed so the horizontal bearers provide supports for multiple planking levels.~~

~~————— (7) Erection. Only the manufacturer of the scaffold or his qualified designated agent shall be permitted to erect or supervise the erection of scaffolds exceeding fifty (50) feet in height above the base, unless such structure is approved in writing by a licensed professional engineer, or erected in accordance with instructions furnished by the manufacturer.~~

#### 33.4. Definitions applicable to this subpart:

~~————— (a) "Ladders"~~

~~————— (1) "Cleats" ladder crosspieces of rectangular cross section placed on edge on which a person may step in ascending or descending.~~

~~————— (2) "Single cleat ladder" one which consists of a pair of side rails, usually parallel, but with flared side rails permissible, connected together with cleats that are joined to the side rails at regular intervals.~~

~~————— "Double cleat ladder" one that is similar to a single cleat ladder, but is wider, with an additional center rail which will allow for two (2) way traffic for workmen in ascending and descending.~~

~~————— (b) "Scaffolding"~~

~~————— (1) "Bearer" a horizontal member of a scaffold upon which the platform rests and which may be supported by ledgers.~~

~~————— (2) "Boatswain's chair" a seat supported by slings attached to a suspended rope, designed to accommodate one (1) workman in a sitting position.~~

~~————— (3) "Brace" a tie that holds one (1) scaffold member in a fixed position with respect to another member.~~

~~————— (4) "Bricklayers' square scaffold" a scaffold composed of framed wood squares which support a platform, limited to light and medium duty.~~

~~————— (5) "Carpenters' bracket scaffold" a scaffold consisting of wood or metal brackets supporting a platform.~~

~~————— (6) "Coupler" a device for locking together the component parts of a tubular metal scaffold. (The material used for the couplers shall be of a structural type, such as drop-forged steel, malleable iron, or structural grade aluminum.)~~

~~————— (7) "Crawling board" or "chicken ladder" a plank with cleats spaced and secured at equal intervals, for use by a worker on roofs, not designed to carry any material.~~

~~————— (8) "Double pole" or "independent pole scaffold" a scaffold supported from the base by a double row of uprights, independent of support from the walls, and constructed of uprights, ledgers, horizontal platform bearers, and diagonal bracing.~~

~~————— (9) "Float" or "Ship scaffold" a scaffold hung from overhead supports by means of ropes and consisting of substantial platform having diagonal bracing underneath, resting upon and securely fastened to two (2) parallel plank bearers at right angles to the span.~~

~~————— (10) "Guardrail" a rail secured to uprights and erected along the exposed sides and ends of platforms.~~

~~————— (11) "Heavy duty scaffold" a scaffold designed and constructed to carry a working load not to exceed seventy-five (75) pounds per square foot.~~

~~————— (12) "Horse scaffold" a scaffold for light or medium duty, composed of horses supporting a work platform.~~

~~————— (13) "Interior hung scaffold" a scaffold suspended from the ceiling or roof structure.~~

~~————— (14) "Ladder jack scaffold" a light duty scaffold supported by brackets attached to ladders.~~

~~————— (15) "Ledgers (stringers)" a horizontal scaffold member which extends from post to post and which supports the putlogs or bearers forming a tie between the posts.~~

~~————— (16) "Light duty scaffold" a scaffold designed and constructed to carry a working load not to exceed twenty-five (25) pounds per square foot.~~

~~————— (17) "Manually propelled mobile scaffold" a portable rolling scaffold supported by casters.~~

~~————— (18) "Masons' adjustable multiple-point suspension scaffold" A scaffold having a continuous platform supported by bearers suspended by wire rope from overhead supports, so arranged and operated as to permit the raising or lowering of the platform to desired working positions.~~

~~————— (19) "Maximum rated load" the total of all loads including the working load, the weight of the scaffold, and such other loads as may be reasonably anticipated.~~

~~————— (20) "Medium duty scaffold" a scaffold designed and constructed to carry a working load not to exceed fifty (50) pounds per square foot.~~

~~————— (21) "Midrail" a rail approximately midway between the guardrail and platform, secured to the uprights erected along the exposed sides and ends of platforms.~~

~~————— (22) "Needle beam scaffold" a light duty scaffold consisting of needle beams supporting a platform.~~

~~————— (23) "Outrigger scaffold" a scaffold supported by outriggers or thrustouts projecting beyond the wall or face of the building or structure, the inboard ends of which are secured inside of such building or structure.~~

~~————— (24) "Putlog" a scaffold member upon which the platform rests.~~

~~————— (25) "Roofing or bearer bracket" a bracket used in slope roof construction, having provisions for fastening to the roof or supported by ropes fastened over the ridge and secured to some suitable object.~~

~~————— (26) "Runner" the lengthwise horizontal bracing or bearing members or both.~~

~~————— (27) "Scaffold" any temporary elevated platform and its supporting structure used for supporting workmen or materials, or both.~~

~~————— (28) "Single-point adjustable suspension scaffold" a manually or power-operated unit designed for light duty use, supported by a single wire rope from an overhead support so arranged and operated as to permit the raising or lowering of platform to desired working positions.~~

~~————— (29) "Single-pole scaffold" platforms resting on putlogs or cross beams, the outside ends of which are supported on ledgers secured to a single row of posts or uprights, and the inner ends of which are supported on or in a wall.~~

~~————— (30) "Stone-setters' adjustable multiple-point suspension scaffold" a swinging type scaffold having a platform supported by hangers suspended at four (4) points so as to permit the raising or lowering of the platform to the desired working position by the use of hoisting machines.~~

~~————— (31) "Toeboard" a barrier secured along the sides and ends of a platform to guard against the falling of material.~~

~~————— (32) "Tube and coupler scaffold" an assembly consisting of tubing which serves as posts, bearers, braces, ties, and runners, a base supporting the posts and special couplers which serve to connect the uprights and to join the various members.~~

~~————— (33) "Tubular welded frame scaffold" a sectional panel or frame metal scaffold substantially built up of prefabricated welded sections which consists of posts and horizontal bearer with intermediate members.~~

~~————— (34) "Two-point suspension scaffold (swinging scaffold)" a scaffold, the platform of which is supported by hangers (stirrups) at two (2) points, suspended from overhead supports so as to permit the raising or lowering of the platform to the desired working position by tackle or hoisting machines.~~

~~————— (35) "Window-jack scaffold" a scaffold, the platform of which is supported by a bracket of jack which projects through a window opening.~~

~~————— (36) "Working load" a load imposed by men, materials, and equipment.~~

~~————— (37) "Ladder stand" a mobile fixed size self-supporting ladder consisting of a wide flat tread ladder in the form of stairs. The assembly may include handrails.~~

### ~~33.5. Guardrails, handrails, and covers:~~

~~————— (a) General provisions. This subpart shall apply to temporary or emergency conditions where there is danger of employees or materials falling through floor, roof, or wall openings or from stairways, or runways.~~

~~———— (b) Guarding of floor openings and floor holes:~~

~~———— (1) Floor openings shall be guarded by a standard railing and toeboards or cover, as specified in paragraph (f) of this Section. In general, the railing shall be provided on all exposed sides, except at entrances to stairways:~~

~~———— (2) Ladderway floor openings or platforms shall be guarded by standard railings with standard toeboards on all exposed sides, except at entrances to opening, with the passage through the railing either provided with a swinging gate or so offset that a person cannot walk directly into the opening:~~

~~———— (3) Hatchways and chute floor openings shall be guarded by one (1) of the following:~~

~~———— (i) Hinged covers of standard strength and construction and a standard railing with only one (1) exposed side. When the opening is not in use, the cover shall be closed or the exposed side shall be guarded at both top and intermediate positions by removable standard railings;~~

~~———— (ii) A removable standard railing with toeboard on not more than two (2) sides of the opening and fixed standard railings with toeboards on all other exposed sides. The removable railing shall be kept in place when the opening is not in use and should preferably be hinged or otherwise mounted so as to be conveniently replaceable:~~

~~———— (4) Wherever there is danger of falling through a skylight opening, it shall be guarded by a fixed standard railing on all exposed sides or a cover capable of sustaining the weight of a two hundred (200) pound person:~~

~~———— (5) Pits and trap door floor openings shall be guarded by floor opening covers of standard strength and construction. While the cover is not in place, the pit or trap openings shall be protected on all exposed sides by removable standard railings:~~

~~———— (6) Manhole floor openings shall be guarded by standard covers which need not be hinged in place. While the cover is not in place, the manhole opening shall be protected by standard railings:~~

~~———— (7) Temporary floor openings shall have standard railings:~~

~~———— (8) Floor holes, into which persons can accidentally walk, shall be guarded by either a standard railing with standard toeboard on all exposed sides, or a floor hole cover of standard strength and construction that is secured against accidental displacement. While the cover is not in place, the floor hole shall be protected by a standard railing:~~

~~———— (9) Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than twenty (20) inches:~~

~~———— (c) Guarding of wall openings:~~

~~———— (1) Wall openings, from which there is a drop of more than four (4) feet, and the bottom of the opening is less than three (3) feet above the working surface, shall be guarded as follows:~~

~~———— (i) When the height and placement of the opening in relation to the working surface is such that either a standard rail or intermediate rail will effectively reduce the danger of falling, one (1) or~~

both shall be provided;

~~————— (ii) The bottom of a wall opening, which is less than four (4) inches above the working surface, regardless of width, shall be protected by a standard toeboard or an enclosing screen either of solid construction or as specified in paragraph (f)(7)(ii) of this Section.~~

~~————— (2) An extension platform outside a wall opening onto which materials can be hoisted for handling shall have side rails or equivalent guards of standard specifications. One (1) side of an extension platform may have removable railings in order to facilitate handling materials.~~

~~————— (3) When a chute is attached to an opening, the provisions of paragraph (c)(1) of this Section shall apply, except that a toeboard is not required.~~

~~————— (d) Guarding of open-sided floors, platforms, and runways:~~

~~————— (1) Every open-sided floor or platform six (6) feet or more above adjacent floor or ground level shall be guarded by a standard railing, or the equivalent, as specified in paragraph (f)(1) of this Section, all open sides, except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a standard toeboard wherever, beneath the open sides, persons can pass, or there is moving machinery, or there is equipment with which falling materials could create a hazard.~~

~~————— (2) Runways shall be guarded by a standard railing, or the equivalent as specified in paragraph (f) of this Section, on all open sides, four (4) feet or more above the floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard shall also be provided on each exposed side.~~

~~————— (3) Runways used exclusively for special purposes may have the railing on one (1) side omitted where operating condition necessitate such omission, providing the falling hazard is minimized by using a runway not less than eighteen (18) inches wide.~~

~~————— (4) Where employees entering upon runways become thereby exposed to machinery, electrical equipment, or other danger not a falling hazard, additional guarding shall be provided.~~

~~————— (5) Regardless of height, open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, pickling or galvanizing tanks, degreasing units, and similar hazards shall be guarded with a standard railing and toeboard.~~

~~————— (e) Stairway railings and guards:~~

~~————— (1) Every flight of stairs having four (4) or more risers shall be equipped with standard stair railings or standard handrails as specified below, the width of the stair to be measured clear of all obstructions except handrails:~~

~~————— (i) On stairways less than forty-four (44) inches wide having both sides enclosed, at least one (1) handrail, preferably on the right side descending;~~

~~————— (ii) On stairways less than forty-four (44) inches wide having one (1) side open, at least one (1) stair railing on the open side;~~

~~————— (iii) On stairways less than forty-four (44) inches wide having both sides open, one (1)~~

stair railing on each side;

~~————— (iv) On stairways more than forty-four (44) inches wide but less than eighty-eight (88) inches wide, one (1) handrail on each enclosed side, and one (1) intermediate stair railing located approximately midway of the width;~~

~~————— (v) On stairways eighty-eight (88) or more inches wide, one (1) handrail on each enclosed side, one (1) stair railing on each open side, and one (1) intermediate stair railing located approximately midway of the width.~~

~~————— (2) Winding stairs shall be equipped with a handrail offset to prevent walking on all portions of the treads having width less than six (6) inches.~~

~~————— (f) Standard specifications:~~

~~————— (1) A standard railing shall consist of top rail, intermediate rail, toeboard and posts, and shall have a vertical height of approximately forty-two (42) inches from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be halfway between the top rail in the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard. Minimum requirements for standard railings under various types of construction are specified in the following paragraphs:~~

~~————— (i) For wood railings, the posts shall be of at least two (2) inch x four (4) inch stock spaced not to exceed eight (8) feet; the top rail shall be of at least two (2) inch x four (4) inch stock; the intermediate rail shall be of at least one (1) inch x six (6) inch stock.~~

~~————— (ii) For pipe steel railings, post and top and intermediate railings shall be at least one and one-half (1-1/2) inches nominal diameter with posts spaced not more than eight (8) feet on centers.~~

~~————— (iii) For structural steel railings, posts and top and intermediate rails shall be of two (2) inch x two (2) inch by three-eighths (3/8) inch angles or other metal shapes of equivalent bending strength, with posts spaced not more than eight (8) feet on centers.~~

~~————— (iv) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least two hundred (200) pounds applied in any direction at any point on the top rail, with a minimum of deflection.~~

~~————— (v) Railings receiving heavy stresses from employees trucking or handling materials shall be provided additional strength by the use of heavier stock, closer spacing of posts, bracing, or by other means:~~

~~————— (vi) Other types, sizes, and arrangements of railing construction are acceptable, provided they meet the following conditions:~~

~~————— (a) A smooth-surfaced top rail at a height above the floor, platform, runway, or ramp level of approximately forty-two (42) inches;~~

~~————— (b) A strength to withstand at least the minimum requirement of two hundred (200)~~

pounds top rail pressure with a minimum of deflection;

~~\_\_\_\_\_ (c) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent at least to that afforded by a standard intermediate rail;~~

~~\_\_\_\_\_ (d) Elimination of overhang of rail ends unless such overhang does not constitute a hazard.~~

~~\_\_\_\_\_ (2) A stair railing shall be of construction similar to a standard railing, but the vertical height shall be not more than thirty-four (34) inches nor less than thirty (30) inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.~~

~~\_\_\_\_\_ (3)~~

~~\_\_\_\_\_ (i) A standard toeboard shall be four (4) inches minimum in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place and have not more than one-quarter (1/4) inch clearance above the floor level. It may be made of any substantial material, either solid, or with openings not over one (1) inch in greatest dimension.~~

~~\_\_\_\_\_ (ii) Where material is piled to such height that a standard toeboard does not provide protection, paneling or screening from floor to intermediate rail or to top rail shall be provided.~~

~~\_\_\_\_\_ (4)~~

~~\_\_\_\_\_ (i) A standard handrail shall be of construction similar to a standard railing except that it is mounted on a wall or partition, and does not include an intermediate rail. It shall have a smooth surface along the top and both sides of the handrail. The handrail shall have an adequate handhold for any one (1) grasping it to avoid falling. Ends of the handrail shall be constructed so as not to constitute a projection hazard.~~

~~\_\_\_\_\_ (ii) The height of handrails shall be not more than thirty-four (34) inches nor less than thirty (30) inches from upper surface of handrail to surface of tread, in line with face of riser or to surface of ramp.~~

~~\_\_\_\_\_ (iii) All handrails and railing shall be provided with a clearance of approximately three (3) inches between the handrail or railing and any other object.~~

~~\_\_\_\_\_ (5) Floor opening covers shall be of any material that meets the following strength requirements:~~

~~\_\_\_\_\_ (i) Conduits, trenches, and manhole covers and their supports, when located in roadways, and vehicular aisles, shall be designed to carry a truck rear-axle load of at least two (2) times the maximum intended load.~~

~~\_\_\_\_\_ (ii) The floor opening cover shall be capable of supporting the maximum intended load and so installed as to prevent accidental displacement.~~

~~\_\_\_\_\_ (6) Skylight openings that create a falling hazard shall be guarded with a standard railing, or covered in accordance with paragraph (5)(ii) of this paragraph.~~

~~———— (7) Wall opening protection shall meet the following requirements:~~

~~———— (i) Barriers shall be of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least two hundred (200) pounds applied in any direction (except upward), with a minimum of deflection at any point on the top rail or corresponding member.~~

~~———— (ii) Screens shall be of such construction and mounting that they are capable of withstanding a load of at least two hundred (200) pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grill work with openings not more than four (4) inch wide with length unrestricted.~~

#### ~~33.6. Guarding floor and wall openings and holes:~~

~~———— (a) Wall hole. An opening less than thirty (30) inches but more than one (1) inch high, of unrestricted width, in any wall or partition, such as a ventilation hole or drainage scupper.~~

~~———— (b) Where there is a hazard of materials falling through a wall hole and the lower edge of the near side of the hole is less than four (4) inches above the floor, and the far side of the hole more than five (5) feet above the next lower level, the hole shall be protected by a standard toeboard, or an enclosing screen either of solid construction or as specified in this section.~~

#### ~~33.7. Stairways:~~

~~———— (a) On all structures, two (2) or more floors (twenty (20) feet or over) in height, stairways, ladders, or ramps shall be provided for employees during the construction period.~~

~~———— (b) Stairway railings and guardrails shall meet the requirements of Section 33.5., paragraphs (e) and (f) of these regulations.~~

~~———— (c) All parts of stairways shall be free of hazardous projections, such as protruding nails.~~

~~———— (d) Debris, and other loose materials, shall not be allowed on or under stairways.~~

~~———— (e) Slippery conditions on stairways shall be eliminated as soon as possible after they occur.~~

~~———— (f) Permanent steel or other metal stairways and landings with hollow pan-type treads that are to be filled with concrete or other materials, when used during construction, shall be filled to the level of the nosing with solid material. The requirement shall not apply during the period of actual construction of the stairways themselves.~~

~~———— (g) Wooden treads for temporary service shall be full width.~~

~~———— (h) Metal landings shall be secured in place before filling.~~

~~———— (i) Temporary stairs shall have a landing not less than thirty (30) inches in the direction of travel at every twelve (12) feet of vertical rise.~~

~~———— (j) Stairs shall be installed at angles to the horizontal between thirty (30) degrees and fifty (50) degrees.~~

~~———— (k) Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one (1) or more treads of the stairs:~~

~~———— (l) All stairs shall be lighted in accordance with this Section:~~

~~———— (m) Spiral stairways shall not be permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway:~~

### 33.8. Definitions applicable to this subject:

~~———— (a) "Floor hole" an opening measuring less than twelve (12) inches but more than one (1) inch in its least dimension in any floor, roof, or platform through which materials but not persons may fall, such as belt hold, pipe opening, or slot opening:~~

~~———— (b) "Floor opening" an opening measuring twelve (12) inches or more in its least dimension in any floor, roof, or platform through which persons may fall:~~

~~———— (c) "Handrail" a bar or pipe supported on brackets from a wall or partition, as on a stairway or ramp, to furnish persons with a handhold in case of tripping:~~

~~———— (d) "Nose, nosing" that portion of a tread projecting beyond the face of the riser immediately below:~~

~~———— (e) "Platform" a working space for persons, elevated above the surrounding floor or ground, such as a balcony or platform for the operation of machinery and equipment:~~

~~———— (f) "Runway" a passageway for persons, elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between buildings:~~

~~———— (g) "Rise" the vertical distance from the top of a tread to the top of the next higher tread:~~

~~———— (h) "Stair platform" an extended step or landing breaking a continuous run of stairs:~~

~~———— (i) "Stair railing" a vertical barrier erected along exposed sides of a stairway to prevent falls of persons:~~

~~———— (j) "Stairs, stairways" a series of steps leading from one (1) level or floor to another, or leading to platforms, pits, boiler rooms, crossovers, or around machinery, tanks, and other equipment that are used more or less continuously or routinely by employees or only occasionally by specific individuals. For the purpose of this subpart, a series of steps and landings having three (3) or more rises constitutes stairs or stairway:~~

~~———— (k) "Standard railing" a vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of persons:~~

~~———— (l) "Standard strength and construction" any construction of railings, covers, or other guards that meets the requirements of this subpart:~~

~~———— (m) "Toeboard" a vertical barrier at floor level erected along exposed edges of a floor opening, platform, runway, or ramp to prevent falls of materials:~~

~~\_\_\_\_\_ (n) "Tread width" the horizontal distance from front to back of tread, including nosing, when used.~~

~~\_\_\_\_\_ (o) "Wall opening" an opening at least thirty (30) inches high and eighteen (18) inches wide, in any wall or partition, through which persons may fall, such as a yardarm doorway or chute opening.~~

### **§36-23-34. ~~Cranes, Derricks, Hoists, Elevators, and Conveyors.~~**

~~34.1.~~ ~~34.2.~~ Material hoists, personnel hoists, and elevators.

34.1.1. ~~(a)~~ General requirements.

34.1.1.a. ~~(1)~~ The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of all hoists and elevators. Where manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a professional engineer competent in the field.

34.1.1.b. ~~(2)~~ Rated load capacities, recommended operating speeds, and special hazard warnings or instructions shall be posted on cars and platforms.

34.1.1.c. ~~(3)~~ Wire rope shall be removed from service when any of the following conditions exist:

34.1.1.c.1. ~~(i)~~ In hoisting ropes, six (6) randomly broken wires in one (1) rope lay or three (3) broken wires in one (1) strand in one (1) rope lay;

34.1.1.c.2. ~~(ii)~~ Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third (1/3) ~~on~~ of the original diameter of the outside wires;

34.1.1.c.3. ~~(iii)~~ Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires;

34.1.1.c.4. ~~(iv)~~ Reduction from nominal diameter of more than three-sixty-fourths (3/64) inch for diameters up to and including three-fourths (3/4) inch; one-sixteenth (1/16) inch for diameters seven-eighths (7/8) to one and one-eighths (1-1/8) inches; and three-thirty-seconds (3/32) inch for diameters one and one-quarter (1-1/4) to one and one-half (1-1/2) inches.

34.1.1.d. ~~(4)~~ Hoisting ropes shall be installed in accordance with the wire rope manufacturer's recommendations.

34.1.1.e. ~~(5)~~ The installation of live booms on hoists is prohibited.

34.1.1.f. ~~(6)~~ The use of endless belt-type man-lifts on construction shall be prohibited.

34.1.2. ~~(b)~~ Material hoists.

34.1.2.a. Operating rules. ~~(1)~~

34.1.2.a.1. ~~(i)~~ Operating rules shall be established and posted at the operator's station of the hoist. Such rules shall include signal system and allowable line speed for various loads. Rules and

notices shall be posted on ~~a~~ the car frame or crosshead in a conspicuous location, including the statement "No Riders Allowed."

34.1.2.a.2. ~~(ii)~~ No person shall be allowed to ride on material hoists except for the purposes of inspection and maintenance.

34.1.2.b. ~~(2)~~ All entrances of the hoistways shall be protected by substantial gates or bars which shall guard the full width of the landing entrance. All hoistway entrance bars and gates shall be painted with diagonal contrasting colors, such as black and yellow stripes.

34.1.2.b.1. ~~(i)~~ Bars shall be not less than two (2) inch ~~×~~ by four (4) inch wooden bars or the equivalent, located two (2) feet from the hoistway line. Bars shall be located not less than thirty-six (36) inches nor more than forty-two (42) inches above the floor.

34.1.2.b.2. ~~(ii)~~ Gates or bars protecting the entrances to hoistways shall be equipped with a latching device.

34.1.2.c. ~~(3)~~ Overhead protective covering of two (2) inch ~~planking. Three-quarter planking,~~ three-quarter (3/4) inch plywood, or other solid material of equivalent strength shall be provided on the top of every material hoist cage or platform.

34.1.2.d. ~~(4)~~ The operator's station of a hoisting machine shall be provided with overhead protection equivalent to tight planking not less than two (2) inches thick. The support for the overhead protection shall be of equal strength.

34.1.2.e. ~~(5)~~ Hoist towers may be used with or without an enclosure on all sides. However, whichever alternative is chosen, the following applicable conditions shall be met:

34.1.2.e.1. ~~(i)~~ When a hoist tower is enclosed, it shall be enclosed on all sides for its entire height with a screen enclosure of one-half (1/2) inch mesh, No. 18 United States gauge wire or equivalent, except for landing access.

34.1.2.e.2. ~~(ii)~~ When a hoist tower is not enclosed, the hoist platform or car shall be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with one-half (1/2) inch mesh, No. 14 United States gauge wire or equivalent. The hoist platform enclosure shall include the required gates for loading and unloading. A six (6) foot high enclosure shall be provided on the unused sides of the hoist tower at ground level.

34.1.2.f. ~~(6)~~ Car arresting devices shall be installed to function in case of rope failure.

34.1.2.g. ~~(7)~~ All material hoist towers shall be designed by a licensed professional engineer.

34.1.2.h. ~~(8)~~ All material hoists shall conform to the requirements of ANSI A10.5-1969, Safety Requirements for material hoists.

34.1.3. ~~(c)~~ Personnel hoists.

34.1.3.a. ~~(1)~~ Hoist towers outside the structure shall be enclosed for the full height of the side or sides used for entrance and exit to the structure. At the lowest landing, the enclosure on the sides not used for exit or entrance to the structure shall be enclosed to a height of at least ten (10) feet.

Other sides of the tower adjacent to floors or scaffold platforms shall be enclosed to a height of ten (10) feet above the level of such floors or scaffolds.

34.1.3.b. ~~(2)~~ Towers inside of structures shall be enclosed on all four (4) sides throughout the full height.

34.1.3.c. ~~(3)~~ Towers shall be anchored to the structure at intervals not exceeding twenty-five (25) feet. In addition to tie-ins, a series of guys shall be installed. Where tie-ins are not practical, the tower shall be anchored by means of guys made of wire rope at least one-half (1/2) inch in diameter, securely fastened to anchorage to ensure stability.

34.1.3.d. ~~(4)~~ Hoistway doors or gates shall be not less than six (6) ~~foot~~ feet six (6) inches high and shall be provided with mechanical locks which cannot be operated from the landing side, and shall be accessible only to persons on the car.

34.1.3.e. ~~(5)~~ Cars shall be permanently enclosed on all sides and the top, except sides used for entrance and exit which have car gates or doors.

34.1.3.f. ~~(6)~~ A door or gate shall be provided at each entrance to the car which shall protect the full width and height of the car entrance opening.

34.1.3.g. ~~(7)~~ Overhead protective covering of two (2) inch ~~planking. Three-quarter~~ planking, three-quarter (3/4) inch plywood, or other solid material or equivalent strength shall be provided on the top of every personnel hoist.

34.1.3.h. ~~(8)~~ Doors or gates shall be provided with electric contacts which do not allow movement of the hoist when door or gate is open.

34.1.3.i. ~~(9)~~ Safeties shall be capable of stopping and holding the car and rated load when traveling at governor tripping speed.

34.1.3.j. ~~(10)~~ Cars shall be provided with a capacity and data plate secured in a conspicuous place on the car or crosshead.

34.1.3.k. ~~(11)~~ Internal combustion engines shall not be permitted for direct drive.

34.1.3.l. ~~(12)~~ Normal and final terminal stopping devices shall be provided.

34.1.3.m. ~~(13)~~ An emergency stop switch shall be provided in the car and marked "Stop".

34.1.3.n. ~~(14)~~ Ropes.

34.1.3.n.1. ~~(i)~~ The minimum number of hoisting ropes shall be three (3) for traction hoists and two (2) for drum-type hoists.

34.1.3.n.2. ~~(ii)~~ The minimum diameter of hoisting and counterweight wire ropes shall be one-half (1/2) inch.

34.1.3.n.3. ~~(iii)~~ Safety factors: ~~(See Table 46).~~

**Minimum Factors of Safety for  
Suspension Wire Ropes**

<b><u>Rope Speed in Feet Per Minute</u></b>	<b><u>Minimum Factor of Safety</u></b>
<u>50</u>	<u>7.60</u>
<u>75</u>	<u>7.75</u>
<u>100</u>	<u>7.95</u>
<u>125</u>	<u>8.10</u>
<u>150</u>	<u>8.25</u>
<u>175</u>	<u>8.40</u>
<u>200</u>	<u>8.60</u>
<u>225</u>	<u>8.75</u>
<u>250</u>	<u>8.90</u>
<u>300</u>	<u>9.20</u>
<u>350</u>	<u>9.50</u>
<u>400</u>	<u>9.75</u>
<u>450</u>	<u>10.00</u>
<u>500</u>	<u>10.25</u>
<u>550</u>	<u>10.45</u>
<u>600</u>	<u>10.70</u>

34.1.3.o. ~~(15)~~ Following assembly and erection of hoists and before being put in service, an inspection and tests of all functions and safety devices shall be made under the supervision of a competent person. A similar inspection and test is required following major alteration of an existing installation. All hoists shall be inspected and tested at not more than three (3) month intervals. ~~Records shall be maintained and kept on file for the duration of the job.~~ The employer shall prepare a certification record which includes the date of the inspection and test of all functions and safety devices that were performed; the signature of the person who performed the and test; and a serial number, or other identifier, for the hoist that was inspected and tested. The most recent certification record shall be maintained on file and made available for inspection by interested persons.

34.1.3.p. ~~(16)~~ All personnel hoists used by employees shall be constructed of materials and components which meet the specifications for materials, construction, safety devices, assembly, and structural integrity as stated in the ANSI A10.4-1963; Safety Requirements for Workmen's Hoists. The requirements of this subparagraph ~~(16)~~ Subdivision 34.1.3.p. do not apply to cantilever type personnel hoists.

34.1.3.q. ~~(17)~~ Personnel hoists additional requirements.

34.1.3.q.1. ~~(i)~~ Personnel hoists used in bridge tower construction shall be approved by a registered professional engineer and erected under the supervision of a qualified engineer competent in this field.

34.1.3.q.2. ~~(ii)~~ When a hoist tower is not enclosed, the hoist platform or car shall be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with three-quarter (3/4) inch mesh of No. 14 United States gauge wire or equivalent. The hoist platform enclosure shall include the required gates for loading and unloading.

34.1.3.q.3. ~~(iii)~~ These hoists shall be inspected and maintained on a weekly basis. Whenever the hoisting equipment is exposed to winds exceeding thirty-five (35) miles per hour, it shall be inspected and put in operable condition before reuse.

34.1.3.q.4. ~~(iv)~~ Wire rope shall be taken out of service when any of the following conditions exist:

34.1.3.q.4.A. ~~(a)~~ In running ropes, six (6) randomly distributed broken wires in one (1) lay or three (3) broken wires in one (1) strand in one (1) lay;

34.1.3.q.4.B. ~~(b)~~ Wear of one-third (1/3) the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;

34.1.3.q.4.C. ~~(c)~~ Evidence of any heat damage from any cause;

34.1.3.q.4.D. ~~(d)~~ Reductions from nominal diameter of more than three-sixty-fourths (3/64) inch for diameters to and including three-quarter (3/4) inch, ~~one and one-sixteenth (1-1/16)~~ (1/16) inch for diameters seven-eighths (7/8) inch to one and one-eighths (1-1/8) inch inclusive, and three-thirty-seconds (3/32) inch for diameters one and one-quarter (1-1/4) to one and one-half (1-1/2) inch inclusive;

34.1.3.q.4.E. ~~(e)~~ In standing ropes, more than two (2) broken wires in one (1) lay in sections beyond end connections or more than one (1) broken wire at an end connection.

34.1.3.q.4.F. ~~(f)~~ Permanent elevators under the care of the employer and used by employees for work covered by this ~~regulation~~ rule shall comply with the requirements of ANSI A17.1-1965 with addenda A17.1a-1967, A17.1b-1968, A167.1c-1969, A16.1d-19760, and inspected in accordance with A167.2-1960 with addenda A167.2a-1965, and A17.2b-1967.

34.2. ~~34.3.~~ Base-mounted drum hoists.

34.2.1. ~~(a)~~ General requirements.

34.2.1.a. ~~(1)~~ Exposed moving parts such as gears, projecting screws, setscrews, chain, cables, chain sprockets, and reciprocating or rotating parts, which constitute a hazard, shall be guarded.

34.2.1.b. ~~(2)~~ All controls used during the normal operation cycle shall be located within easy reach of the operator's station.

34.2.1.c. ~~(3)~~ Electric motor operated hoists shall be provided with:

34.2.1.c.1. ~~(i)~~ A device to disconnect all motors from the line upon power failure and not permit any motor to be restarted until the controller handle is brought to the "Off" position;

34.2.1.c.2. ~~(ii)~~ Where applicable, an overspeed preventive device;

34.2.1.c.3. ~~(iii)~~ A means whereby remotely operated hoists stop when any control is ineffective.

34.2.1.d. ~~(4)~~ All base-mounted drum hoists in use shall meet the applicable requirements for design, construction, installation, testing, inspection, maintenance and operations, as prescribed by the manufacturer.

34.2.2. This section does not apply to base-mounted drum hoists used in conjunction with derricks. Base-mounted drum hoists used in conjunction with derricks must conform to §36-23-42.

34.3. ~~34.4.~~ Overhead hoists.

34.3.1. ~~(1)~~ The safe working load of the overhead hoist, as determined by the manufacturer, shall be indicated on the hoist, and this safe working load shall not be exceeded.

34.3.2. ~~(2)~~ The supporting structure to which the hoist is attached shall have a safe working load equal to that of the hoist.

34.3.3. ~~(3)~~ The support shall be arranged so as to provide for free movement of the hoist and shall not restrict the hoist from lining itself up with the load.

34.3.4. ~~(4)~~ The hoist shall be installed only in locations that will permit the operator to stand clear of the load at all times.

34.3.5. ~~(5)~~ Air hoists shall be connected to an air supply of sufficient capacity and pressure to safely operate the hoist. All air hoses supplying air shall be positively connected to prevent their becoming disconnected during use.

34.3.6. ~~(6)~~ All overhead hoists in use shall meet the applicable requirements for construction, design, installation, testing, inspection, maintenance and operation, as prescribed by the manufacturer.

34.4. ~~34.5.~~ Conveyors.

34.4.1. ~~(a)~~ General requirements.

34.4.1.a. ~~(1)~~ Means for stopping the motor or engine shall be provided at the operator's station. Conveyor systems shall be equipped with an audible warning signal to be sounded immediately

before starting up the conveyor.

34.4.1.b. ~~(2)~~ If the operator's station is at a remote point, similar provisions for stopping the motor or engine shall be provided at the motor or engine location.

34.4.1.c. ~~(3)~~ Emergency stop switches shall be arranged so that the conveyor cannot be started again until the actuating stop switch has been reset to running or "On" position.

34.4.1.d. ~~(4)~~ Screw conveyors shall be guarded to prevent employee contact with turning flights.

34.4.1.e. ~~(5)~~ Where a conveyor passes over work areas, aisles, or thoroughfares, suitable guards shall be provided to protect employees required to work below the conveyors.

34.4.1.f. ~~(6)~~ All crossovers, aisles and passageways shall be conspicuously marked by suitable signs, as required in ~~these rules and regulations~~ this rule.

34.4.1.g. ~~(7)~~ Conveyors shall be locked out or otherwise rendered inoperable and tagged out with a "Do Not Operate" tag during repairs and when operation is hazardous to employees performing maintenance work.

34.4.1.h. ~~(8)~~ All conveyors in use shall meet the applicable requirements for design, construction, inspection, testing, maintenance and operation, as prescribed in the ANSI B20.1-1957, Safety Code for Conveyors, Cableways and Related Equipment.

#### ~~34.1. Cranes and derricks:~~

##### ~~—— (a) General requirements:~~

~~—— (1) The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks:~~

~~—— When manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a qualified engineer competent in this field and such determinations will be appropriately documented and recorded. Attachments used with cranes shall not exceed the capacity, rating, or scope recommended by the manufacturer:~~

~~—— (2) Rated load capacities, and recommended operating speeds, special hazard warnings, or instruction, shall be conspicuously posted on all equipment. Instructions or warnings shall be visible to the operator while he is at his control station:~~

~~—— (3) Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals shall be posted at the job site:~~

~~—— (4) The employer shall designate a competent person who shall inspect all machinery and equipment each shift prior to each use, and during use, to make sure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use:~~

~~—— (5) A thorough, annual inspection of the hoisting machinery shall be made by a competent person, or by a private agency recognized by the United States Department of Labor. The employer shall~~

~~maintain a record of the time and dates and results of each inspection for each hoisting machine and piece of equipment:~~

~~————— (6) Wire rope shall be taken out of service when any of the following conditions exist:~~

~~————— (i) In running ropes, six (6) randomly distributed broken wires or three (3) broken wires in one (1) lay;~~

~~————— (ii) Wear of one-third (1/3) the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;~~

~~————— (iii) Evidence of any heat damage from any cause;~~

~~————— (iv) Reductions from nominal diameter of more than one-sixty-fourth (1/64) inch for diameters up to and including five-sixteenths (5/16) inch, one-thirty-two (1/32) inches for diameters three-eighths (3/8) inch to and including one-half (1/2) inch, three-sixty-fourths (3/64) inch, for diameters nine-sixteenths (9/16) inch to and including three-fourths (3/4) inch, one-sixteenths (1/16) inch for diameters seven-eighths (7/8) inch to one and one-eighths (1 1/8) inches inclusive, three-thirty-two (3/32) inch for diameters one and one-quarter (1 1/4) to one and one-half (1 1/2) inches inclusive;~~

~~————— (v) In standing ropes, more than two (2) broken wires in one (1) lay in sections beyond end connections or more than one (1) broken wire at an end connection.~~

~~————— (vi) Wire rope safety factors shall be in accordance with American National Standards Institute B30.5-1968 or SAE J959-1966.~~

~~————— (7) Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or other moving parts or equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding shall meet the requirements of the American National Standards Institute B15.1-1958 Rev. Safety code for Mechanical Power Transmission Apparatus.~~

~~————— (8) Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.~~

~~————— (9) All exhaust pipes shall be guarded or insulated in areas where contact by employees is possible in the performance of normal duties.~~

~~————— (10) Whenever internal combustion engine powered equipment exhausts in enclosed spaces, tests shall be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres.~~

~~————— (11) All windows in cabs shall be of safety glass, or equivalent, that introduces no visible distortion that will interfere with the safe operation of the machine.~~

~~————— (12)~~

~~————— (i) Where necessary for rigging or service requirements, a ladder, or steps, shall be provided to give access to a cab roof.~~

~~\_\_\_\_\_ (ii) Guardrails, handholds, and steps shall be provided on cranes for each access to the car and cab, conforming the ANSI B30.5:~~

~~\_\_\_\_\_ (iii) Platforms and walkways shall have anti-skid surfaces:~~

~~\_\_\_\_\_ (13) Fuel tank filler pipe shall be located in such a position, or protected in such a manner, as not to allow spill or overflow to run onto the engine, exhaust, or electrical equipment of any machine being fueled:~~

~~\_\_\_\_\_ (i) An accessible fire extinguisher of 5BC rating, or higher, shall be available at all operator stations or cabs of equipment:~~

~~\_\_\_\_\_ (ii) All fuels shall be transported, stored, and handled to meet the rules of Subpart F of this part. When fuel is transported by vehicles on public highways Department of Transportation rules contained in 49 CFR Parts 177 and 393 concerning such vehicular transportation are considered applicable:~~

~~\_\_\_\_\_ (14) Except where electrical distribution and transmission lines have been deenergized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with the following:~~

~~\_\_\_\_\_ (i) For lines rated fifty (50)kV. or below, minimum clearance between the lines and any part of the crane or load shall be ten (10) feet;~~

~~\_\_\_\_\_ (ii) For lines rated over fifty (50)kV., minimum clearance between the lines and any part of the crane or load shall be ten (10) feet plus four-tenths (0.4) inch for each one (1)kV. over fifty (50)kV., or twice the length of the line insulator, but never less than ten (10) feet;~~

~~\_\_\_\_\_ (iii) In transit with no load and boom lowered, the equipment clearance shall be a minimum of four (4) feet for voltages, less than forty (40)kV., up to and including three hundred forty-five (345)kV. and sixteen (16) feet for voltages up to and including seven hundred fifty (750)kV.;~~

~~\_\_\_\_\_ (iv) A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means;~~

~~\_\_\_\_\_ (v) Cage-type boom guards, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not alter the requirements of any other regulation of this part even if such device is required by law or regulation:~~

~~\_\_\_\_\_ (vi) Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded;~~

~~\_\_\_\_\_ (vii) Prior to work near transmitter towers where an electric charge can be induced in the equipment or materials begin handled, the transmitter shall be deenergized or tests shall be made to determine if electrical charge is induced on the crane. The following precautions shall be taken when necessary to dissipate induced voltages:~~

~~\_\_\_\_\_ (a) The equipment shall be provided with an electrical ground directly to the upper rotating structure supporting the boom;~~

~~\_\_\_\_\_ (b) Ground jumper cables shall be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters. Crews shall be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load; and~~

~~\_\_\_\_\_ (c) Combustible and flammable materials shall be removed from the immediate area prior to operation.~~

~~\_\_\_\_\_ (15) No modifications or additions which affect the capacity or safe operation of the equipment shall be made by the employer without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation and maintenance instruction plates, tags, or decals, shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.~~

~~\_\_\_\_\_ (16) The employer shall comply with Power Crane and Shovel Association Mobile Hydraulic Crane Standard No. 2.~~

~~\_\_\_\_\_ (17) Sideboom cranes mounted on wheel or crawler tractors shall meet the requirements of SAE J743-1964.~~

~~\_\_\_\_\_ (b) Crawler, locomotive and truck cranes:~~

~~\_\_\_\_\_ (1) All jibs shall have positive stops to prevent their movement of more than five (5) degrees above the straight line of the jib and boom on conventional type crane booms. The use of cable type belly slings does not constitute compliance with this rule.~~

~~\_\_\_\_\_ (2) All crawler, truck or locomotive cranes in use shall meet the applicable requirements for design, inspection, construction, testing, maintenance and operation as prescribed in the ANSI B30.5-1968, Safety Code for Crawler Locomotives and Truck Cranes.~~

~~\_\_\_\_\_ (c) Hammerhead tower cranes:~~

~~\_\_\_\_\_ (1) Adequate clearance shall be maintained between moving and rotating structures of the crane and fixed objects to allow the passage of employees without harm.~~

~~\_\_\_\_\_ (2) Employees required to perform duties on the horizontal boom of hammerhead tower cranes shall be protected against falling by guardrails or by safety belts and lanyards attached to lifelines in conformance with this section.~~

~~\_\_\_\_\_ (3) Buffers shall be provided at both ends of travel of the trolley.~~

~~\_\_\_\_\_ (4) Cranes mounted on rail tracks shall be equipped with limit switches limiting the travel of the crane on the track and stops or buffers at each end of the tracks.~~

~~\_\_\_\_\_ (5) All hammerhead tower cranes in use shall meet the applicable requirements for design, construction, installation, testing, maintenance, inspection and operation as prescribed by the manufacturer.~~

~~———— (d) Overhead and gantry cranes:~~

~~———— (1) The rated load of the crane shall be plainly marked on each side of the crane, and if the crane has more than one (1) hoisting unit, each hoist shall have its rated load marked on it or its load block, and this marking shall be clearly legible from the ground or floor.~~

~~———— (2) Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the truck wheels.~~

~~———— (3) Except for floor-operated cranes, a gong or other effective audible warning signal shall be provided for each crane equipped with a power traveling mechanism.~~

~~———— (4) All overhead and gantry cranes in use shall meet the applicable requirements for design, construction, installation, inspection, testing, maintenance, inspection, and operation as prescribed in the ANSI B30.2-1967, Safety Code for Overhead and Gantry Cranes.~~

~~———— (e) Derricks. All derricks in use shall meet the applicable requirements for design, construction, installation, inspection, testing, maintenance, and operations as prescribed in ANSI B30.6-1969, Safety Code for Derricks.~~

~~———— 34.6. Aerial lifts:~~

~~———— (a) General requirements:~~

~~———— (1) Unless otherwise provided in this Section, aerial lifts acquired for use on or after the effective date of this Section shall be designed and constructed in conformance with the applicable requirements of the American National Standard for vehicle-mounted elevating and rotating work platforms, ANSI A92.2-1969, including appendix. Aerial lifts acquired before the effective date of this Section, which do not meet the requirements of ANSI A92.2-1969, may not be used after January 1, 1976, unless they shall have been modified so as to conform with the applicable design and construction requirements of ANSI A92.2-1969. Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job sites above the ground:~~

~~———— (i) Extensible boom platform;~~

~~———— (ii) Aerial ladders;~~

~~———— (iii) Articulating boom platforms;~~

~~———— (iv) Vertical towers; and~~

~~———— (v) A combination of any of the above.~~

~~———— Aerial equipment may be made of metal, wood, fiberglass reinforced plastic, or other material; may be powered or manually operated, and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis.~~

~~———— (2) Aerial lifts may be "Field Modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory to be in conformity with all~~

~~applicable provisions of ANSI A92.2-1969 and this Section, and to be at least as safe as the equipment was before modifications:~~

~~\_\_\_\_\_ (b) Specific requirements:~~

~~\_\_\_\_\_ (1) Ladder trucks and tower trucks. Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.~~

~~\_\_\_\_\_ (2) Extensible and articulating boom platforms:~~

~~\_\_\_\_\_ (i) Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition;~~

~~\_\_\_\_\_ (ii) Only authorized persons shall operate an aerial lift;~~

~~\_\_\_\_\_ (iii) Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted;~~

~~\_\_\_\_\_ (iv) Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position;~~

~~\_\_\_\_\_ (v) A body belt shall be worn and a lanyard attached to the boom or basket when working from aerial lift;~~

~~\_\_\_\_\_ (vi) Boom and basket load limits specified by the manufacturer shall not be exceeded;~~

~~\_\_\_\_\_ (vii) The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed;~~

~~\_\_\_\_\_ (viii) An aerial lift truck shall not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation in accordance with the provisions of subparagraphs (1) and (2) of paragraph (a) of this subsection;~~

~~\_\_\_\_\_ (ix) Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platforms within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency;~~

~~\_\_\_\_\_ (x) Climbers shall not be worn while performing work from an aerial lift;~~

~~\_\_\_\_\_ (xi) The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value; and~~

~~\_\_\_\_\_ (xii) Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position except as provided in subdivision (viii) of this~~

subparagraph:

~~(3) Electrical tests. All electrical tests shall conform to the requirements of ANSI A92.2-1969, Section 5. However, equivalent D.C. voltage tests may be used in lieu of the A.C. voltage specified in A92.2-1969, D.C. voltage tests which are approved by the equipment manufacturer or equivalent entity shall be considered an equivalent test for the purpose of this subparagraph.~~

~~(4) Bursting safety factor. The provisions of the American National Standards Institute, Standard ANSI A92.2-1969, Section 4.9, Bursting Safety Factor, shall apply to all critical hydraulic and pneumatic components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least two (2) to one (1).~~

~~(5) Welding standards. All welding shall conform to the following standards as applicable:~~

~~(i) Standard qualification procedure, AWS D3.0-41;~~

~~(ii) Recommended practices for automotive welding design, AWS D8.4-61;~~

~~(iii) Standard qualifications of welding procedures and welders for piping and tubing, AWS D10.9-69; and~~

~~(iv) Specifications for welding highway and railway bridges, AWS D2.0-69.~~

### **§36-23-35. Motor Vehicles; and Mechanized Equipment; ~~and Marine Operations.~~**

#### **35.1. Equipment.**

##### **35.1.1. ~~(a)~~ General requirements.**

35.1.1.a. ~~(1)~~ All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors or barricades equipped with appropriate light or reflectors, to identify the location of the equipment.

35.1.1.b. ~~(2)~~ A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

35.1.1.c. ~~(3)~~ ~~(i)~~ Heavy machinery, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise. ~~(ii)~~ Whenever the equipment is parked, the parking brake shall be set. Equipment parked on ~~the line~~ inclines shall have the wheels chocked and the parking brake set.

35.1.1.d. ~~(4)~~ The use, care and charging of all batteries shall conform to the requirements of this Section.

35.1.1.e. ~~(5)~~ All cab glass shall be safety glass, or equivalent, that introduces no visible

distortion affecting the safe operation of any machine.

35.1.1.f. (6) All equipment covered by this subpart Section shall comply with the requirements of these regulations this rule when working or being moved in the vicinity of power lines or energized transmitters.

35.1.1.g. All equipment covered by this Section shall comply with the following requirements when working or being moved in the vicinity of power lines or energized transmitters, except where electrical distribution and transmission lines have been deenergized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines:

35.1.1.g.1. For lines rated 50 kV or below, minimum clearance between the lines and any part of the crane or load shall be ten (10) feet;

35.1.1.g.2. For lines rated over 50 kV, minimum clearance between the lines and any part of the crane or load shall be ten (10) feet plus four-tenths (4/10) inch for each 1 kV over 50 kV, or twice the length of the line insulator, but never less than ten (10) feet;

35.1.1.g.3. In transit with no load and boom lowered, the equipment clearance shall be a minimum of four (4) feet for voltages less than 50 kV, and ten (10) feet for voltages over 50 kV, up to and including 345 kV, and sixteen (16) feet for voltages up to and including 750 kV;

35.1.1.g.4. A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means;

35.1.1.g.5. Cage-type boom guards, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not alter the requirements of any other regulation of this part even if such device is required by law or regulation;

35.1.1.g.6. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded;

35.1.1.g.7. Prior to work near transmitter towers where an electrical charge can be induced in the equipment or materials being handled, the transmitter shall be de-energized or tests shall be made to determine if electrical charge is induced on the crane. The following precautions shall be taken when necessary to dissipate induced voltages:

35.1.1.g.7.A. The equipment shall be provided with an electrical ground directly to the upper rotating structure supporting the boom; and

35.1.1.g.7.B. Ground jumper cables shall be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters. Crews shall be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load.

35.1.1.g.7.C. Combustible and flammable materials shall be removed from the immediate area prior to operations.

~~35.2. Handling materials—General.~~ Rolling railroad cars. Derail and/or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area.

~~35.3. Air receivers:~~

~~———(a) General requirements:~~

~~———(1) Application. This Section applies to compressed air receivers and other equipment used in providing and utilizing compressed air for performing operation such as cleaning, drilling, hoisting and chipping. On the other hand, however, this Section does not deal with the special problems created when men work in compressed air as in tunnels and caissons. This Section is not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment.~~

~~———(2) New and existing equipment:~~

~~———(i) All new air receivers installed after the effective date of these regulations shall be constructed in accordance with the 1968 edition of the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII.~~

~~———(ii) All safety valves used shall be constructed, installed and maintained in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII, 1968 Edition.~~

~~———(b) Installation and equipment requirements:~~

~~———(1) Installation. Air receivers shall be so installed that all drains, handholes, and manholes therein are easily accessible. Air receivers should be supported with sufficient clearance to permit a complete external inspection and to avoid corrosion of external surfaces. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place. The receiver should be located as close to the compressor or aftercooler as is possible in order to keep the discharge pipe short.~~

~~———(2) Drains and traps. A drain pipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water. The drain valve on the air receiver shall be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.~~

~~———(3) Gauges and valves:~~

~~———(i) Every air receiver shall be equipped with an indicating pressure gauge (so located as to be readily visible) and one (1) or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than ten (10) percent.~~

~~———(ii) No valve of any type shall be placed between the air receiver and its safety valve or valves.~~

~~———(iii) Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located and installed so that they cannot be readily rendered inoperative by any means, including the elements.~~

~~(iv) All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.~~

35.3. ~~35.4.~~ Motor vehicles.

35.3.1. ~~(a)~~ Coverage. Motor vehicles as covered by this ~~part~~ Section are those vehicles that operate within an off-highway jobsite, not open to public traffic. The requirements of this Section do not apply to equipment for which rules are prescribed in ~~these rules and regulations~~ Section 35.4. (Material Handling Equipment).

35.3.2. ~~(b)~~ General requirements.

35.3.2.a. ~~(1)~~ All vehicles shall have a service brake system, an emergency brake system, and a parking brake system. These systems may use common components and shall be maintained in operable condition.

35.3.2.b. ~~(i)~~ Whenever visibility conditions warrant additional light, all vehicles or combinations of vehicles in use shall be equipped with at least two (2) headlights and two (2) taillights in operable condition.

35.3.2.c. ~~(ii)~~ All vehicles, or combination of vehicles, shall have brake lights in operable condition regardless of light conditions.

35.3.2.d. ~~(3)~~ All vehicles shall be equipped with an adequate audible warning device at the operator's station and in an operable condition.

35.3.2.e. ~~(4)~~ No employer shall use any motor vehicle equipment having an obstructed view to the ~~rear~~ rear unless:

35.3.2.e.1. ~~(i)~~ The vehicle has a reverse signal alarm audible above the surrounding noise level; or

35.3.2.e.2. ~~(ii)~~ The vehicle is backed up only when an observer signals that it is safe to do so.

35.3.2.f. ~~(5)~~ All vehicles with cabs shall be equipped with windshields and powered wipers. Cracked and broken glass shall be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields shall be equipped with operable defogging or defrosting devices.

35.3.2.g. ~~(6)~~ All haulage vehicles whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a ~~cab~~ cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

35.3.2.h. ~~(7)~~ Tools and material shall be secured to prevent movement when transported in the same compartment with employees.

35.3.2.i. ~~(8)~~ Vehicles used to transport employees shall have seats firmly secured and adequate for the number of employees to be carried.

35.3.2.j. ~~(9)~~ Seat belts and anchorages meeting the requirements of 49 CFR Part 571

(Department of Transportation, Federal Motor Vehicle Safety Standards) shall be installed in all motor vehicles.

35.3.2.k. ~~(10)~~ Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.

35.3.2.l. ~~(11)~~ Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device which will prevent accidental starting or tripping the mechanism.

35.3.2.m. ~~(12)~~ Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.

35.3.2.n. ~~(13)~~ All rubber-tired motor vehicles shall be equipped with fenders.

35.3.2.o. ~~(14)~~ Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

35.3.2.p. ~~(15)~~ All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition, and free of apparent damage that could cause failure while in use: Service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls and safety devices. All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

#### 35.4. ~~35.5.~~ Material handling equipment.

##### 35.4.1. ~~(a)~~ Earthmoving equipment; general.

35.4.1.a. ~~(1)~~ ~~These rules apply~~ This Section applies to the following types of earthmoving equipment; scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment. The promulgation of specific rules for compactors and rubber-tired "Skid-Steer" equipment is reserved pending consideration of standards currently being developed.

##### 35.4.1.b. ~~(2)~~ Seat belts.

35.4.1.b.1. ~~(i)~~ Seat belts shall be provided on all equipment covered by this section, and shall meet the requirements of the Society of Automotive Engineers J386-1969. Seat belts for agricultural and light industrial tractors shall meet the seat belt requirements of Society of Automotive Engineers J333A-1970: Operator Protection for Agricultural and Light Industrial Tractors.

35.4.1.b.2. ~~(ii)~~ Seat belts need not be provided for equipment which is designed only for stand up operation.

##### 35.4.1.c. ~~(3)~~ Access roadways and grades.

35.4.1.c.1. ~~(i)~~ No employer shall move or cause to be moved construction equipment or vehicles upon any access roadway or grade unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.

35.4.1.c.2. ~~(ii)~~ Every emergency access ramp and berm used by an employer shall be constructed to restrain and control runaway vehicles.

~~(iii) Seat belts need not be provided for equipment which does not have roll-over protective structure (ROPS) or adequate canopy protection.~~

35.4.1.d. ~~(4)~~ Brakes. All earthmoving equipment mentioned in ~~35.5.(a)~~ Subdivision 35.4.1.a. shall have a service braking system capable of stopping and holding the equipment fully loaded, as specified in Society of Automotive Engineers SAE-J237, Loader Dozer-1971, J236, Graders-1971, and J319b, Scrapers-1971. Brake systems for self-propelled rubber tired off-highway equipment manufactured after January 1, 1972, shall meet the applicable minimum performance criteria set forth in the following Society of Automotive Engineers Recommended Practices:

Self-propelled scrapers .....	SAE J319b-1971
Self-propelled graders .....	SAE J236-1971
Trucks and wagons .....	SAE J166-1971
Front end loaders and dozers .....	SAE J237-1971

35.4.1.e. ~~(5)~~ Fenders. Pneumatic-tired earthmoving haulage equipment (trucks, scrapers, tractors and trailing units) whose maximum speed exceeds fifteen (15) miles per hour, shall be equipped with fenders on all wheels to meet the requirements of Society of Automotive Engineers SAE J321-A-1970, Fenders for Pneumatic-Tired Earthmoving ~~Haulage~~ Haulage Equipment.

35.4.1.f. ~~(6)~~ Rollover protective structures (ROPS). See OSHA §1926 Subpart W ~~of this part~~ for requirements for rollover protective structures and overhead protection.

~~(7) Specific effective dates--brakes and fenders:~~

~~(i) Equipment mentioned in subparagraphs (4) and (5) of the paragraph, and manufactured after January 1, 1972, which is used by an employer after that date, shall comply with the applicable rules prescribed therein concerning brakes and fenders. Employers may request variations from the applicable brakes and fender standards required by this subpart. Employers wishing to seek variations from the applicable brakes and fenders rules may submit any requests for variations after the publication of this document. Any statements intending to meet the requirements should specify how the variation would protect the safety of the employees by providing for any compensating restrictions on the operations of equipment.~~

35.4.1.g. ~~(8)~~ Audible alarms.

35.4.1.g.1. ~~(i)~~ All bi-directional machines, such as rollers, compactors, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in an operative condition.

35.4.1.g.2. ~~(ii)~~ No employer shall permit earthmoving or compacting equipment which has an obstructed view to the rear to be used in reverse gear unless the equipment has in operation a

reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do so. ~~Where equipment is operated in close proximity to employees, a signal man shall be designated to direct the operation of the equipment.~~

35.4.1.h. ~~(9)~~ Scissor points. Scissor points on all front-end loaders ~~which~~ that constitute a hazard to the operator during normal operation shall be guarded.

35.4.2. ~~(b)~~ Excavating and other equipment.

35.4.2.a. ~~(1)~~ Tractors covered in ~~paragraph (a)~~ Subsection 35.4.1. shall have seat belts as required for the operators when seated in the normal seating arrangement for tractor operation, even though back-hoes, breakers, or other similar attachments are used on these machines for excavating or other work.

35.4.2.b. ~~(2)~~ For the purposes of this ~~subpart~~ Subsection, the nomenclatures and descriptions for measurement of dimensions of machinery and attachments shall be as described in the Society of Automotive Engineers 1970 handbook, pages one thousand eighty-eight (1088) through one thousand one hundred three (1103).

35.4.2.c. ~~(3)~~ The safety requirements, ratios, or limitations applicable to machines or attachment usage covered in Power Crane and Shovel Association's Standards No. 1 and No. 2 of 1968, and No. 3 of 1969, shall be complied with, and shall apply to cranes, machines, and attachments under this section.

35.4.3. ~~(c)~~ Lifting and hauling equipment (other than equipment covered under this ~~part~~ Subsection).

35.4.3.a. ~~(1)~~ Industrial trucks shall meet the following requirements:

35.4.3.a.1. ~~(i)~~ Lift trucks, ~~stakers~~ stackers, etc., shall have the rated capacity clearly posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also shall be clearly shown on the vehicle. These ratings shall not be exceeded.

35.4.3.a.2. ~~(ii)~~ No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval. If such ~~notifications~~ modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.

35.4.3.a.3. ~~(iii)~~ If a load is lifted by two (2) or more trucks working in unison, the proportion of the total load carried by any one (1) truck shall not exceed its capacity.

35.4.3.a.4. ~~(iv)~~ Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering handwheel to spin. The steering knob shall be mounted within the periphery of the wheel.

35.4.3.a.5. ~~(v)~~ All high lift rider industrial trucks shall be equipped with overhead guards which meet the configuration and structural requirements as defined in paragraph 421 of American National Standards Institute B56.1-1969, Safety Standards for Powered Industrial Trucks.

35.4.3.a.6. ~~(vi)~~ All industrial trucks in use shall meet the applicable requirements of design, construction, stability, inspection, testing, maintenance, and operation as defined in American National Standards Institute B56.1-1969, Safety Standards for Powered Industrial Trucks.

35.4.3.a.7. Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.

35.4.3.a.8. Whenever a truck is equipped with vertical only, or vertical and horizontal controls elevatable with the lifting carriage or forks for lifting personnel, the following additional precautions shall be taken for the protection of personnel being elevated.

35.4.3.a.8.A. Use of a safety platform firmly secured to the lifting carriage and/or forks.

35.4.3.a.8.B. Means shall be provided whereby personnel on the platform can shut off power to the truck.

35.4.3.a.8.C. Such protection from falling objects as indicated necessary by the operating conditions shall be provided.

### 35.5. Pile driving equipment.

#### 35.5.1. ~~(a)~~ General requirements.

35.5.1.a. ~~(1)~~ Boilers and piping systems which are a part of, or used with, pile driving equipment shall meet the applicable requirements of the American Society of Mechanical Engineers, Power Boilers (Section 1).

35.5.1.b. ~~(2)~~ All pressure vessels which are a part of, or used with, pile driving equipment shall meet the applicable requirements of the American Society of Mechanical Engineers, Pressure Vessels (Section 8).

35.5.1.c. ~~(3)~~ Overhead protection, which will not obscure the vision of the operator and which meets the requirements of ~~these regulations~~ this rule, shall be provided. Protection shall be the equivalent of two (2) inch planking or other solid material of equivalent strength.

35.5.1.d. ~~(4)~~ Stop blocks shall be provided for the leads to prevent the hammer from being raised against the head block.

35.5.1.e. ~~(5)~~ A blocking device, capable of safely supporting the weight of the hammer, shall be provided for placement in the leads under the hammer at all times while employees are working under the hammer.

35.5.1.f. ~~(6)~~ Guards shall be provided across the top of the head block to prevent the cable from jumping out of the sheaves.

35.5.1.g. ~~(7)~~ When the leads must be inclined in the driving of batter piles, provisions shall be made to stabilize the leads.

35.5.1.h. ~~(8)~~ Fixed leads shall be provided with ladder, and adequate rings, or similar

attachment points, so that the loft worker may engage his/her safety belt lanyard to the leads. If the leads are provided with loft platform(s), such platform(s) shall be protected by standard guardrails.

35.5.1.i. ~~(9)~~ Steam hose leading to a steam hammer or jet pipe shall be securely attached to the hammer with an adequate length of at least one-quarter (1/4) inch diameter chain or cable to prevent whipping in the event the hoist at the hammer is broken. Air hammer hoses shall be provided with the same protection as required for steam lines.

35.5.1.i. ~~(10)~~ Safety chains, or equivalent means, shall be provided for each hose connection to prevent the line from thrashing around in case the coupling becomes disconnected.

35.5.1.k. ~~(11)~~ Steam line controls shall consist of two (2) shutoff valves, one (1) of which shall be a quick-acting lever type within easy reach of the hammer operator.

35.5.1.l. ~~(12)~~ Guys, outriggers, thrustouts, or counter-balances shall be provided as necessary to maintain stability of pile driver rigs.

35.5.2. ~~(b)~~ Pile driving from barges and floats. Barges or floats supporting pile driving operations shall meet the applicable requirements of ~~these regulations~~ OSHA §1926.605, Marine Operations and Equipment.

35.5.3. ~~(c)~~ Pile driving equipment.

35.5.3.a. ~~(1)~~ Engineers and ~~winchmen~~ winch personnel shall accept signals only from the designated ~~signalmen~~ signal personnel.

35.5.3.b. ~~(2)~~ All employees shall be kept clear when piling is being hoisted into the leads.

35.5.3.c. ~~(3)~~ When piles are being driven in an excavated pit, the walls of the pit shall be sloped to the angle of repose or sheet-piled and braced.

35.5.3.d. ~~(4)~~ When steel tube piles are being "blown out", employees shall be kept well beyond the range of falling materials.

35.5.3.e. ~~(5)~~ When it is necessary to cut off the tops of driven piles, pile driving operations shall be suspended except where the cutting operations are located at least twice the length of the longest pile from the driver.

35.5.3.f. ~~(6)~~ When driving jacked piles, all access pits shall be provided with ladders and bulkheaded curbs to prevent material from falling into the pit.

## **§36-23-36. Excavations, Trenching, and Shoring.**

### 36.1. Definitions.

36.1.1. "Accepted engineering practices" shall mean those requirements which are compatible with standards of practice required by a registered professional engineer.

36.1.2. "Aluminum hydraulic shoring" shall mean a pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or

horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

36.1.3. "Bell-bottom pier hole" shall mean a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

36.1.4. "Benching" ("benching system") shall mean a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

36.1.5. "Cave-in" shall mean the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

36.1.6. "Competent person" shall mean one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

36.1.7. "Cross braces" shall mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

36.1.8. "Excavation" shall mean any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

36.1.9. "Faces" or "sides" shall mean the vertical or inclined earth surfaces formed as a result of excavation work.

36.1.10. "Failure" shall mean the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

36.1.11. "Hazardous atmosphere" shall mean an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

36.1.12. "Kickout" shall mean the accidental release or failure of a cross brace.

36.1.13. "Protective system" shall mean a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

36.1.14. "Ramp" shall mean an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

36.1.15. "Registered professional engineer" shall mean a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this

standard when approving designs for “manufactured protective systems” or “tabulated data” to be used in interstate commerce.

36.1.16. “Sheeting” shall mean the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

36.1.17. “Shield” (“shield system”) shall mean a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with §§36-23-36.3.3.c. or 36-23-36.3.3.d. Shields used in trenches are usually referred to as “trench boxes” or “trench shields.”

36.1.18. “Shoring” (“shoring system”) shall mean a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

36.1.19. “Sides.” See “Faces.”

36.1.20. “Sloping” (“sloping system”) shall mean a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

36.1.21. “Stable rock” shall mean natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

36.1.22. “Structural ramp” shall mean a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

36.1.23. “Support system” shall mean a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

36.1.24. “Tabulated data” shall mean tables and charts approved by a registered professional engineer and used to design and construct a protective system.

36.1.25. “Trench” (“trench excavation”) shall mean a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than fifteen (15) feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to fifteen (15) feet or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

36.1.26. “Trench box.” See “Shield.”

36.1.27. “Trench shield.” See “Shield.”

36.1.28. “Uprights” shall mean the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other.

Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

36.1.29. "Wales" shall mean horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

### 36.2. Specific excavation requirements.

36.2.1. Surface encumbrances. All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

#### 36.2.2. Underground installations.

36.2.2.a. The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

36.2.2.b. Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within twenty-four (24) hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

36.2.2.c. When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined and marked by safe and acceptable means.

36.2.2.d. While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

#### 36.2.3. Access and egress.

##### 36.2.3.a. Structural ramps.

36.2.3.a.1. Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

36.2.3.a.2. Ramps and runways constructed of two (2) or more structural members shall have the structural members connected together to prevent displacement.

36.2.3.a.3. Structural members used for ramps and runways shall be of uniform thickness.

36.2.3.a.4. Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

36.2.3.a.5. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

36.2.3.b. Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are four (4) feet or more in depth so as to require no more than twenty-five (25) feet of lateral travel for employees.

36.2.4. Exposure to vehicular traffic. Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

36.2.5. Exposure to falling loads. No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped with a cab shield and/or canopy to provide adequate protection for the operator during loading and unloading operations.

36.2.6. Warning system for mobile equipment. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

36.2.7. Hazardous atmospheres.

36.2.7.a. Testing and controls. In addition to the requirements set forth in Subparts D and E of 29 CFR §§1926.50-1926.107 to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

36.2.7.a.1. Where oxygen deficiency (atmospheres containing less than nineteen and five-tenths (19.5) percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than four (4) feet in depth.

36.2.7.a.2. Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than nineteen and five-tenths (19.5) percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with Subparts D and E of 29 CFR §§1926.50-1926.107 respectively.

36.2.7.a.3. Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of twenty (20) percent of the lower flammable limit of the gas.

36.2.7.a.4. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

36.2.7.b. Emergency rescue equipment.

36.2.7.b.1. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

36.2.7.b.2. Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

#### 36.2.8. Protection from hazards associated with water accumulation.

36.2.8.a. Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

36.2.8.b. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

36.2.8.c. If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with §§36-23-36.2.8.a. and 36-23-36.2.8.b.

#### 36.2.9. Stability of adjacent structures.

36.2.9.a. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

36.2.9.b. Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

36.2.9.b.1. A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

36.2.9.b.2. The excavation is in stable rock; or

36.2.9.b.3. A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

36.2.9.b.4. A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

36.2.9.c. Sidewalks, pavements, and appurtenant structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

36.2.10. Protection of employees from loose rock or soil.

36.2.10.a. Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

36.2.10.b. Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two (2) feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

36.2.11. Inspections.

36.2.11.a. Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

36.2.11.a.1. Such inspections shall be recorded in a book approved by the Director and kept for a period of one (1) year.

36.2.11.a.2. Such records shall be made available for inspection by interested persons.

36.2.11.b. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

36.2.12. Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §36-23-41.4.2. shall be provided where walkways are six (6) feet or more above lower levels.

36.3. Requirements for protective systems.

36.3.1. Protection of employees in excavations.

36.3.1.a. Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with §§36-23-36.3.2. or 36-23-36.3.3. except when:

36.3.1.a.1. Excavations are made entirely in stable rock; or

36.3.1.a.2. Excavations are less than five (5) feet in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

36.3.1.b. Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

36.3.2. Design of sloping and benching systems. The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his/her designee and shall be in accordance with the requirements of 36-23-36.3.2.a.; or in the alternative, §36-23-36.3.2.b.; or in the alternative, §36-23-36.3.2.c.; or in the alternative, §36-23-36.3.2.d., as follows:

36.3.2.a. Option (1)-Allowable configurations and slopes.

36.3.2.a.1. Excavations shall be sloped at an angle not steeper than one and one-half (1-1/2) horizontal to one (1) vertical (thirty-four (34) degrees measured from the horizontal), unless the employer uses one of the other options listed below.

36.3.2.a.2. Slopes specified in §36-23-36.3.2.a.1. shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to Subpart P of 29 CFR §1926.

36.3.2.b. Option (2)-Determination of slopes and configurations using Appendices A and B to Subpart P of 29 CFR §1926. Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B.

36.3.2.c. Option (3)-Designs using other tabulated data.

36.3.2.c.1. Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

36.3.2.c.2. The tabulated data shall be in written form and shall include all of the following:

36.3.2.c.2.A. Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

36.3.2.c.2.B. Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

36.3.2.c.2.C. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

36.3.2.c.3. At least one (1) copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available for inspection by interested persons.

36.3.2.d. Option (4)-Design by a registered professional engineer.

36.3.2.d.1. Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under §36-23-36.3.2. of this rule shall be approved by a registered professional engineer.

36.3.2.d.2. Designs shall be in written form and shall include at least the following:

36.3.2.d.2.A. The magnitude of the slopes that were determined to be safe for the particular project;

36.3.2.d.2.B. The configurations that were determined to be safe for the particular project; and

36.3.2.d.2.C. The identity of the registered professional engineer approving the design.

36.3.2.d.3. At least one (1) copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available for inspection by interested persons.

36.3.3. Design of support systems, shield systems, and other protective systems. Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his/her designee and shall be in accordance with the requirements of §36-23-36.3.3.a.; or in the alternative, §36-23-36.3.3.b.; or in the alternative, §36-23-36.3.3.d., as follows:

36.3.3.a. Option (1)-Designs using Appendices A, C and D to Subpart P of 29 CFR §1926. Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in Appendices A and C. Designs for aluminum hydraulic shoring shall be in accordance with §36-23-36.3.3.b., but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with Appendix D.

36.3.3.b. Option (2)-Designs Using Manufacturer's Tabulated Data.

36.3.3.b.1. Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

36.3.3.b.2. Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

36.3.3.b.3. Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available for inspection by interested persons.

36.3.3.c. Option (3)-Designs using other tabulated data.

36.3.3.c.1. Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

36.3.3.c.2. The tabulated data shall be in written form and include all of the following:

36.3.3.c.2.A. Identification of the parameters that affect the selection of a protective system drawn from such data;

36.3.3.c.2.B. Identification of the limits of use of the data;

36.3.3.c.2.C. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

36.3.3.c.3. At least one (1) copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available for inspection by interested persons.

36.3.3.d. Option (4)-Design by a registered professional engineer.

36.3.3.d.1. Support systems, shield systems, and other protective systems not utilizing Option (1), Option (2) or Option (3), above, shall be approved by a registered professional engineer.

36.3.3.d.2. Designs shall be in written form and shall include the following:

36.3.3.d.2.A. A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

36.3.3.d.2.B. The identity of the registered professional engineer approving the design.

36.3.3.d.3. At least one (1) copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available for inspection by interested persons.

36.3.4. Materials and equipment.

36.3.4.a. Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

36.3.4.b. Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

36.3.4.c. When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

36.3.5. Installation and removal of support.

36.3.5.a. General.

36.3.5.a.1. Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

36.3.5.a.2. Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

36.3.5.a.3. Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

36.3.5.a.4. Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

36.3.5.a.5. Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

36.3.5.a.6. Backfilling shall progress together with the removal of support systems from excavations.

36.3.5.b. Additional requirements for support systems for trench excavations.

36.3.5.b.1. Excavation of material to a level no greater than two (2) feet below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

36.3.5.b.2. Installation of a support system shall be closely coordinated with the excavation of trenches.

36.3.6. Sloping and benching systems. Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

36.3.7. Shield systems.

36.3.7.a. General.

36.3.7.a.1. Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

36.3.7.a.2. Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

36.3.7.a.3. Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

36.3.7.a.4. Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

36.3.7.b. Additional requirement for shield systems used in trench excavations. Excavations of earth material to a level not greater than two (2) feet below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

~~36.1. General protection requirements:~~

~~—— (a) Walkways, runways, and sidewalks shall be kept clear of excavated material or other obstructions and no sidewalks shall be undermined unless shored to carry a minimum live load of one hundred and twenty-five (125) pounds per square foot:~~

~~—— (b) If planks are used for raised walkways, runways, or sidewalks, they shall be laid parallel to the length of the walk and fastened together against displacement:~~

~~—— (c) Planks shall be uniform in thickness and all exposed ends shall be provided with beveled cleats to prevent tripping:~~

~~—— (d) Raised walkways, runways, and sidewalks shall be provided with plank steps on strong stringers. Ramps, used in lieu of steps, shall be provided with cleats to insure a safe walking surface:~~

~~—— (e) All employees shall be provided with and protected with personal protective equipment for the protection of the head, eyes, respiratory organs, hands, feet and other parts of the body:~~

~~—— (f) Employees exposed to vehicular traffic shall be provided with and shall be instructed to wear warning vests marked with or made of reflectorized or high visibility material:~~

~~—— (g) Employees subjected to hazardous dusts, gases, fumes, mists, or atmospheres deficient in oxygen shall be provided with and protected with approved respiratory protection:~~

~~—— (h) No person shall be permitted under loads handled by power shovels, derricks, or hoists. To avoid any spillage, employees shall be required to stand away from any vehicle being loaded:~~

~~—— (i) Daily inspections of excavations shall be made at the beginning of and periodically during each shift by a certified and competent person. If evidence of possible cave-ins or slides is apparent, all work in the excavation shall cease until the necessary precautions have been taken to safeguard the employees:~~

~~—— 36.2. Specific excavation requirements:~~

~~—— (a) Prior to opening and excavation, effort shall be made to determine whether underground installations, i.e., sewer, telephone, water, fuel, electric lines, etc., will be encountered and, if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation:~~

~~—— (b) Trees, boulders, and other surface encumbrances, located so as to create a hazard to employees involved in excavation work or in the vicinity thereof at any time during operations, shall be removed or made safe before excavating is begun:~~

~~—— (c) The walls and faces of all excavations in which employees are exposed to danger from moving ground shall be guarded by a shoring system, sloping of the ground, or some other equivalent means:~~

~~—— (d) Excavations shall be inspected by a competent and certified person after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins shall be increased if necessary:~~

~~—— (e) The determination of the angle of repose and design of the supporting system shall be based on careful evaluation of pertinent factors such as: Depth or cut; anticipated changes in materials from exposure to air, sun, water, or freezing; loading imposed by structures, equipment, overlying material, or stored material; and vibration from equipment, blasting, traffic, or other sources:~~

~~—— (f) supporting systems, i.e., piling, cribbing, shoring, etc., shall be designed by a qualified person and meet accepted engineering requirements. When tie rods are used to restrain the top of the sheeting or other retaining systems, the rods shall be securely anchored well back of the angle of repose. When tight sheeting or sheet piling is used, full loading due to groundwater table shall be assumed, unless prevented by weep holes or drains or other means. Additional stringers, ties, and bracing shall be provided to allow for any necessary temporary removal of individual supports:~~

~~—— (g) All slopes shall be excavated to at least the angle of repose except for areas where solid rock allows for line drilling or presplitting:~~

~~—— (h) The angle of repose shall be flattened when an excavation has water conditions, silty materials, loose boulders, and areas where erosion, deep frost action, and slide planes appear:~~

~~—— (i)~~

~~—— (1) In excavations which employees may be required to enter, excavated or other material shall effectively be stored and retained at least two (2) feet or more from the edge of the excavation:~~

~~—— (2) As an alternative to the clearance prescribed in subparagraph (1) of this paragraph, the employer may use effective barriers or other retaining devices in lieu thereof in order to prevent excavated or other materials from falling into the excavation:~~

~~—— (j) Sides, slopes, and faces of all excavations shall meet accepted engineering requirements by scaling, benching, barricading, rock bolting, wire meshing, or other equally effective means. Special attention shall be given to slopes which may be adversely affected by weather or moisture content:~~

~~—— (k) Support systems shall be planned and designed by a qualified person when excavation is in excess of twenty (20) feet in depth, adjacent to structures or improvements, or subject to vibration or ground water:~~

~~—— (l) Materials used for sheeting, sheet piling, cribbing, bracing, shoring, and underpinning shall be in good serviceable condition, and timbers shall be sound, free from large or loose knots, and of proper dimensions:~~

~~—— (m) Special precautions shall be taken in sloping or shoring the sides of excavations adjacent to a previously back-filled excavation or a fill, particularly when the separation is less than the depth of the~~

excavation. Particular attention also shall be paid to joints and seams of material comprising a face and the slope of such seams and joints:

~~—— (n) Except in hard rock, excavations below the level of the base of footing of any foundation or retaining wall shall not be permitted, unless the wall is underpinned and all other precautions taken to insure the stability of the adjacent walls for the protection of employees involved in excavation work or in the vicinity thereof.~~

~~—— (o) If the stability of adjoining buildings or walls is endangered by excavations, shoring, bracing, or underpinning shall be provided as necessary to insure their safety. Such shoring, bracing, or underpinning shall be inspected daily or more often, as conditions warrant, by a competent person and the protection effectively maintained.~~

~~—— (p) Diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Water shall not be allowed to accumulate in an excavation.~~

~~—— (q) It is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above and near an excavation, the side of the excavation shall be sheet-piled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.~~

~~—— (r) Blasting and the use of explosives shall be performed in accordance with these rules and regulations.~~

~~—— (s) When mobile equipment is utilized or allowed adjacent to excavations, substantial stop logs or barricades shall be installed. If possible, the grade should be away from the excavation.~~

~~—— (t) Adequate barrier physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be back-filled.~~

~~—— (u) If possible, dust conditions shall be kept to a minimum by the use of water, salt, calcium chloride, oil, or other means.~~

~~—— (v) In locations where oxygen deficiency or gaseous conditions are possible, air in the excavation shall be tested immediately prior to working entering such area, at least every two (2) hours and as often as necessary to protect the safety of the workers. Controls, as set forth in these regulations shall be established to assure acceptable atmospheric conditions. When flammable gases are present, adequate ventilation shall be provided or sources of ignition shall be eliminated. Attended emergency rescue equipment, such as breathing apparatus, a safety harness and line, basket stretcher, etc., shall be readily available where adverse atmospheric conditions may exist or develop in an excavation.~~

~~—— (w) Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails shall be provided.~~

~~—— (x) Where ramps are used for employees or equipment, they shall be designed and constructed by qualified persons in accordance with accepted engineering requirements.~~

~~—— (y) All ladders used on excavation operations shall be in accordance with the requirements of these regulations.~~

~~36.3. Specific trenching requirements:~~

~~(a) Banks more than five (5) feet high shall be shored, laid back to a stable slope, or some other equivalent means of protection shall be provided where employees may be exposed to moving ground or cave-ins. Refer to Table 47 as a guide in sloping of banks. Trenches less than five (5) feet in depth shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected.~~

~~(b) Sides of trenches is unstable or soft material, five (5) feet or more in depth, shall be shored, sheeted, braced, sloped, or otherwise supported by means of sufficient strength to protect the employees working within them. See Tables 47 and 48:~~

~~(c) Sides of trenches in hard or compact soil, including embankments, shall be shored or otherwise supported when the trench is more than five (5) feet in depth and eight (8) feet or more in length. In lieu of shoring, the sides of the trench above the five (5) foot level may be sloped to preclude collapse, but shall not be steeper than a one (1) foot rise to each one-half (1/2) foot horizontal. When the outside diameter of a pipe is greater than six (6) feet, a bench of four (4) foot minimum shall be provided at the toe of the sloped portion:~~

~~(d) Materials used for sheeting and sheet piling, bracing, shoring, and underpinning, shall be in good serviceable condition, and timbers used shall be sound and free from large or loose knots, and shall be designed and installed so as to be effective to the bottom of the excavation:~~

~~(e) Additional precautions by way of shoring and bracing shall be taken to prevent slides or caveins when excavations or trenches are made in locations adjacent to backfilled excavations, or where excavations are subjected to vibrations from railroad or highway traffic, the operation of machinery, or any other source:~~

~~(f) Employees entering bell-bottom pier holes shall be protected by the installation of a removable-type casing of sufficient strength to resist shifting of the surrounding earth. Such temporary protection shall be provided for the full depth of that part of each pier hole which is above the bell. A lifeline, suitable for instant rescue and securely fastened to a shoulder harness, shall be worn by each employee entering the shafts. This lifeline shall be individually manned and separate from any line used to remove materials excavated from the bell footing:~~

~~(g)~~

~~(1) Minimum requirements for trench timbering shall be in accordance with Table 48:~~

~~(2) Braces and diagonal shores in a wood shoring system shall not be subjected to compressive stress in excess of values given by the following formula:~~

~~$$S = 1300 - 20L/D$$~~

~~Maximum ratio  $L/D = 50$~~

~~Where:~~

~~L = Length, unsupported, in inches~~

~~D = Least side of the timber, in inches~~

~~S = Allowable stress in pounds per square inch of cross-section~~

~~(h) When employees are required to be in trenches four (4) feet deep or more, an adequate~~

~~means of exit, such as a ladder or steps, shall be provided and located so as to require no more than twenty-five (25) feet of lateral travel.~~

~~—— (i) Bracing or shoring of trenches shall be carried along with the excavation.~~

~~—— (j) Cross braces or trench jacks shall be placed in true horizontal position, be spaced vertically, and be secured to prevent sliding, falling, or kickouts.~~

~~—— (k) Portable trench boxes or sliding trench shield may be used for the protection of personnel in lieu of a shoring system or sloping. Where such trench boxes or shields are used, they shall be designed, constructed, and maintained in a manner which will provide protection equal to or greater than the sheeting or shoring required for the trench.~~

~~—— (l) Backfilling and removal of trench supports shall progress together from the bottom of the trench. Jacks or braces shall be released slowly and, in unstable soil, ropes shall be used to pull out the jacks or braces from above after employees have cleared the trench.~~

~~—— 36.4. Definitions applicable to this subsection.~~

~~—— (a) "Accepted engineering requirements (or practice)" Those requirements or practices which are compatible with standards required by a registered architect, a registered professional engineer, or other duly licensed or recognized authority.~~

~~—— (b) "Angle of repose" the greatest angle above the horizontal plane at which a material will lie without sliding.~~

~~—— (c) "Bank" A mass of soil rising above a digging level.~~

~~—— (d) "Belled excavation" A part of a shaft or footing excavation, usually near the bottom and bell-shaped, i.e., an enlargement of the cross section above.~~

~~—— (e) "Braces (trench)" The horizontal members of the shoring system whose ends bear against the uprights or stringers.~~

~~—— (f) "Excavation" Any man-made cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a trench.~~

~~—— (g) "Faces." See paragraph (k) of this section.~~

~~—— (h) "Hard compact soil" All earth materials not classified as running or unstable.~~

~~—— (i) "Kickouts" Accidental release or failure of a shore or brace.~~

~~—— (j) "Sheet pile" A pile or sheeting that may form one (1) of a continuous interlocking line, or a row of timber, concrete, or steel piles, driven in close contact to provide a tight wall to resist the lateral pressure of water, adjacent earth, or other materials.~~

~~—— (k) "Sides," "walls," or "faces" The vertical or inclined earth surfaces formed as a result of~~

excavation work:

—— (l) “Slope” The angle with the horizontal at which a particular earth material will stand indefinitely without movement.

—— (m) “Stringers (wales)” the horizontal members of a shoring system whose sides bear against the uprights or earth.

—— (n) “Trench” A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than fifteen (15) feet.

—— (o) “Trench jack” Screw or hydraulic type jacks used as cross bracing in a trench shoring system.

—— (p) “Trench shield” A shoring system composed of steel plates and bracing, welded or bolted together, which support the walls of a trench from the ground level to the trench bottom and which can be moved along as work progresses.

—— (q) “Unstable soil” Earth material, other than running that, because of its nature or the influence of related conditions, cannot be depended upon to remain in place without extra support, such as would be furnished by a system of shoring.

—— (r) “Uprights” The vertical members of a shoring system.

—— (s) “Wales.” See paragraph (m) of this section.

—— (t) “Walls.” See paragraph (k) of this section.

### **§36-23-37. Concrete, ~~Concrete Forms, and Shoring~~ and Masonry Construction.**

#### 37.1. Definitions applicable to this Section.

37.1.1. “Bull float” shall mean a tool used to spread out and smooth concrete.

37.1.2. “Formwork” shall mean the total system of support for freshly placed or partially cured concrete, including the mold sheathing (form) that is in contact with the concrete as well as all supporting members, including shores, reshores, hardware, braces, and related hardware.

37.1.3. “Jacking operation” shall mean the task of lifting a slab (or group of slabs) vertically from one location to another (e.g., from the casting location to a temporary (parked) location, or to its final location in the structure), during the construction of a building/structure where the lift-slab process is being used.

37.1.4. “Lift slab” shall mean a method of concrete construction in which floor and roof slabs are cast on or at ground level and, using jacks, lifted into position.

37.1.5. “Limited access zone” shall mean an area alongside a masonry wall which is under construction and which is clearly demarcated to limit access by employees.

37.1.6. “Precast concrete” shall mean concrete members (such as walls, panels, slabs, columns, and beams) which have been formed, cast, and cured prior to final placement in a structure.

37.1.7. "Reshoring" shall mean the construction operation in which shoring equipment (also called reshores or reshoring equipment) is placed, as the original forms and shores are removed, in order to support partially cured concrete and construction loads.

37.1.8. "Shore" shall mean a supporting member that resists a compressive force imposed by a load.

37.1.9. "Vertical slip forms" shall mean forms which are jacked vertically during the placement of concrete.

37.2. General requirements.

37.2.1. Construction loads. No construction loads shall be placed on a concrete structure or portion of a concrete structure unless the employer determines, based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the loads.

37.2.2. Reinforcing steel. All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement.

37.2.3. Post-tensioning operations.

37.2.3.a. No employee (except those essential to the post-tensioning operations) shall be permitted to be behind the jack during tensioning operations.

37.2.3.b. Signs and barriers shall be erected to limit employee access to the post-tensioning area during tensioning operations.

37.2.4. Riding concrete buckets. No employee shall be permitted to ride concrete buckets.

37.2.5. Working under loads.

37.2.5.a. No employee shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position.

37.2.5.b. To the extent practical, elevated concrete buckets shall be routed so that no employee, or the fewest number of employees, are exposed to the hazards associated with falling concrete buckets.

37.2.6. Personal protective equipment. No employee shall be permitted to apply a cement, sand, and water mixture through a pneumatic hose unless the employee is wearing protective head and face equipment.

37.3. Requirements for equipment and tools.

37.3.1. Bulk cement storage.

37.3.1.a. Bulk storage bins, containers, and silos shall be equipped with the following:

37.3.1.a.1. Conical or tapered bottoms; and

37.3.1.a.2. Mechanical or pneumatic means of starting the flow of material.

37.3.1.b. No employee shall be permitted to enter storage facilities unless the ejection system has been shut down, locked out, and tagged to indicate that the ejection system is not to be operated.

37.3.2. Concrete mixers. Concrete mixers with one (1) cubic yard or larger loading skips shall be equipped with the following:

37.3.2.a. A mechanical device to clear the skip of materials; and

37.3.2.b. Guardrails installed on each side of the skip.

37.3.3. Power concrete trowels. Powered and rotating type concrete troweling machines that are manually guided shall be equipped with a control switch that will automatically shut off the power whenever the hands of the operator are removed from the equipment handles.

37.3.4. Concrete buggies. Concrete buggy handles shall not extend beyond the wheels on either side of the buggy.

37.3.5. Concrete pumping systems.

37.3.5.a. Concrete pumping systems using discharge pipes shall be provided with pipe supports designed for one hundred (100) percent overload.

37.3.5.b. Compressed air hoses used on concrete pumping systems shall be provided with positive fail-safe joint connectors to prevent separation of sections when pressurized.

37.3.6. Concrete buckets.

37.3.6.a. Concrete buckets equipped with hydraulic or pneumatic gates shall have positive safety latches or similar safety devices installed to prevent premature or accidental dumping.

37.3.6.b. Concrete buckets shall be designed to prevent concrete from hanging up on the top and the sides.

37.3.7. Tremies. Sections of tremies and similar concrete conveyances shall be secured with wire rope (or equivalent materials) in addition to the regular couplings or connections.

37.3.8. Bull floats. Bull float handles used where they might contact energized electrical conductors, shall be constructed of nonconductive material or insulated with a nonconductive sheath whose electrical and mechanical characteristics provide the equivalent protection of a handle constructed of nonconductive material.

37.3.9. Masonry saws.

37.3.9.a. Masonry saws shall be guarded with a semicircular enclosure over the blade.

37.3.9.b. A method for retaining blade fragments shall be incorporated in the design of the semicircular enclosure.

37.3.10. Lockout/Tagout procedures.

37.3.10.a. No employee shall be permitted to perform maintenance or repair activity on equipment (such as compressors, mixers, screens or pumps used for concrete and masonry construction activities) where the inadvertent operation of the equipment could occur and cause injury, unless all potentially hazardous energy sources have been locked out and tagged.

37.3.10.b. Tags shall read "Do Not Start" or similar language to indicate that the equipment is not to be operated.

37.4. Requirements for cast-in-place concrete.37.4.1. General requirements for formwork.

37.4.1.a. Formwork shall be designed, fabricated, erected, supported, braced and maintained so that it will be capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork. Formwork which is designed, fabricated, erected, supported, braced and maintained in conformance with Sections 6 and 7 of ANSI A10.9-1983; American National Standard for Construction and Demolition Operations Concrete and Masonry Work, shall be deemed to be in compliance with this Section.

37.4.1.b. Drawings or plans, including all revisions, for the jack layout, formwork (including shoring equipment), working decks, and scaffolds, shall be available at the jobsite.

37.4.2. Shoring and reshoring.

37.4.2.a. All shoring equipment (including equipment used in reshoring operations) shall be inspected prior to erection to determine that the equipment meets the requirements specified in the formwork drawings.

37.4.2.b. Shoring equipment found to be damaged such that its strength is reduced to less than that required by §36-23-37.4.1.a. shall not be used for shoring.

37.4.2.c. Erected shoring equipment shall be inspected immediately prior to, during, and immediately after concrete placement.

37.4.2.d. Shoring equipment that is found to be damaged or weakened after erection, such that its strength is reduced to less than that required by §36-23-37.4.1.a., shall be immediately reinforced.

37.4.2.e. The sills for shoring shall be sound, rigid, and capable of carrying the maximum intended load.

37.4.2.f. All base plates, shore heads, extension devices, and adjustment screws shall be in firm contact, and secured when necessary, with the foundation and the form.

37.4.2.g. Eccentric loads on shore heads and similar members shall be prohibited unless these members have been designed for such loading.

37.4.2.h. Whenever single post shores are used one on top of another (tiered), the

employer shall comply with the following specific requirements in addition to the general requirements for formwork:

37.4.2.h.1. The design of the shoring shall be prepared by a qualified designer and the erected shoring shall be inspected by an engineer qualified in structural design.

37.4.2.h.2. The single post shores shall be vertically aligned.

37.4.2.h.3. The single post shores shall be spliced to prevent misalignment.

37.4.2.h.4. The single post shores shall be adequately braced in two (2) mutually perpendicular directions at the splice level. Each tier shall also be diagonally braced in the same two (2) directions.

37.4.2.i. Adjustment of single post shores to raise formwork shall not be made after the placement of concrete.

37.4.2.j. Reshoring shall be erected, as the original forms and shores are removed, whenever the concrete is required to support loads in excess of its capacity.

#### 37.4.3. Vertical slip forms.

37.4.3.a. The steel rods or pipes on which jacks climb or by which the forms are lifted shall be:

37.4.3.a.1. Specifically designed for that purpose; and

37.4.3.a.2. Adequately braced where not encased in concrete.

37.4.3.b. Forms shall be designed to prevent excessive distortion of the structure during the jacking operation.

37.4.3.c. All vertical slip forms shall be provided with scaffolds or work platforms where employees are required to work or pass.

37.4.3.d. Jacks and vertical supports shall be positioned in such a manner that the loads do not exceed the rated capacity of the jacks.

37.4.3.e. The jacks or other lifting devices shall be provided with mechanical dogs or other automatic holding devices to support the slip forms whenever failure of the power supply or lifting mechanism occurs.

37.4.3.f. The form structure shall be maintained within all design tolerances specified for plumbness during the jacking operation.

37.4.3.g. The predetermined safe rate of lift shall not be exceeded.

#### 37.4.4. Reinforcing steel.

37.4.4.a. Reinforcing steel for walls, piers, columns, and similar vertical structures shall be

adequately supported to prevent overturning and to prevent collapse.

37.4.4.b. Employers shall take measures to prevent unrolled wire mesh from recoiling. Such measures may include, but are not limited to, securing each end of the roll or turning over the roll.

#### 37.4.5. Removal of formwork.

37.4.5.a. Forms and shores (except those used for slabs on grade and slip forms) shall not be removed until the employer determines that the concrete has gained sufficient strength to support its weight and superimposed loads. Such determination shall be based on compliance with one of the following:

37.4.5.a.1. The plans and specifications stipulate conditions for removal of forms and shores, and such conditions have been followed, or

37.4.5.a.2. The concrete has been properly tested with an appropriate ASTM standard test method designed to indicate the concrete compressive strength, and the test results indicate that the concrete has gained sufficient strength to support its weight and superimposed loads.

37.4.5.b. Reshoring shall not be removed until the concrete being supported has attained adequate strength to support its weight and all loads in place upon it.

#### 37.5. Requirements for precast concrete.

37.5.1. Precast concrete wall units, structural framing, and tilt-up wall panels shall be adequately supported to prevent overturning and to prevent collapse until permanent connections are completed.

37.5.2. Lifting inserts which are embedded or otherwise attached to tilt-up precast concrete members shall be capable of supporting at least two (2) times the maximum intended load applied or transmitted to them.

37.5.3. Lifting inserts which are embedded or otherwise attached to precast concrete members, other than the tilt-up members, shall be capable of supporting at least four (4) times the maximum intended load applied or transmitted to them.

37.5.4. Lifting hardware shall be capable of supporting at least five (5) times the maximum intended load applied transmitted to the lifting hardware.

37.5.5. No employee shall be permitted under precast concrete members being lifted or tilted into position except those employees required for the erection of those members.

#### 37.6. Requirements for lift-slab operations.

37.6.1. Lift-slab operations shall be designed and planned by a registered professional engineer who has experience in lift-slab construction. Such plans and designs shall be implemented by the employer and shall include detailed instructions and sketches indicating the prescribed method of erection. These plans and designs shall also include provisions for ensuring lateral stability of the building/structure during construction.

37.6.2. Jacks/lifting units shall be marked to indicate their rated capacity as established by the manufacturer.

37.6.3. Jacks/lifting units shall not be loaded beyond their rated capacity as established by the manufacturer.

37.6.4. Jacking equipment shall be capable of supporting at least two and one-half (2-1/2) times the load being lifted during jacking operations and the equipment shall not be overloaded. For the purpose of this provision, jacking equipment includes any load bearing component which is used to carry out the lifting operation(s). Such equipment includes, but is not limited, to the following: threaded rods, lifting attachments, lifting nuts, hook-up collars, T-caps, shearheads, columns, and footings.

37.6.5. Jacks/lifting units shall be designed and installed so that they will neither lift nor continue to lift when they are loaded in excess of their rated capacity.

37.6.6. Jacks/lifting units shall have a safety device installed which will cause the jacks/lifting units to support the load in any position in the event any jacklifting unit malfunctions or loses its lifting ability.

37.6.7. Jacking operations shall be synchronized in such a manner to ensure even and uniform lifting of the slab. During lifting, all points at which the slab is supported shall be kept within one-half (1/2) inch of that needed to maintain the slab in a level position.

37.6.8. If leveling is automatically controlled, a device shall be installed that will stop the operation when the one-half (1/2) inch tolerance set forth in §36-23-37.6.7. is exceeded or where there is a malfunction in the jacking (lifting) system.

37.6.9. If leveling is maintained by manual controls, such controls shall be located in a central location and attended by a competent person while lifting is in progress. In addition, the competent person must be experienced in the lifting operation and with the lifting equipment being used.

37.6.10. The maximum number of manually controlled jacks/lifting units on one (1) slab shall be limited to a number that will permit the operator to maintain the slab level within specified tolerances of §36-23-37.6.7., but in no case shall that number exceed fourteen (14).

37.6.11. Requirements during jacking operations.

37.6.11.a. No employee, except those essential to the jacking operation, shall be permitted in the building/structure while any jacking operation is taking place unless the building/structure has been reinforced sufficiently to ensure its integrity during erection. The phrase "reinforced sufficiently to ensure its integrity" used in this Section means that a registered professional engineer, independent of the engineer who designed and planned the lifting operation, has determined from the plans that if there is a loss of support at any jack location, that loss will be confined to that location and the structure as a whole will remain stable.

37.6.11.b. Under no circumstances shall any employee who is not essential to the jacking operation be permitted immediately beneath a slab while it is being lifted.

37.6.11.c. For the purpose of §36-23-37.6.11., a jacking operation begins when a slab or group of slabs is lifted and ends when such slabs are secured (with either temporary connections or

permanent connections).

37.6.11.d. Employers who comply with Appendix A to OSHA §1926.705; Lift Slab Operations; shall be considered to be in compliance with the provisions of §§36-23-37.6.11.a. through 36-23-37.6.11.c.

37.6.12. When making temporary connections to support slabs, wedges shall be secured by tack welding, or an equivalent method of securing the wedges to prevent them from falling out of position. Lifting rods may not be released until the wedges at that column have been secured.

37.6.13. All welding on temporary and permanent connections shall be performed by a certified welder, familiar with the welding requirements specified in the plans and specifications for the lift-slab operation.

37.6.14. Load transfer from jacks/lifting units to building columns shall not be executed until the welds on the column shear plates (weld blocks) are cooled to air temperature.

37.6.15. Jacks/lifting units shall be positively secured to building columns so that they do not become dislodged or dislocated.

37.6.16. Equipment shall be designed and installed so that the lifting rods cannot slip out of position or the employer shall institute other measures, such as the use of locking or blocking devices, which will provide positive connection between the lifting rods and attachments and will prevent components from disengaging during lifting operations.

### 37.7. Requirements for masonry construction.

37.7.1. A limited access zone shall be established whenever a masonry wall is being constructed. The limited access zone shall conform to the following:

37.7.1.a. The limited access zone shall be established prior to the start of construction of the wall.

37.7.1.b. The limited access zone shall be equal to the height of the wall to be constructed plus four (4) feet, and shall run the entire length of the wall.

37.7.1.c. The limited access zone shall be established on the side of the wall which will be unscaffolded.

37.7.1.d. The limited access zone shall be restricted to entry by employees actively engaged in constructing the wall. No other employees shall be permitted to enter the zone.

37.7.1.e. The limited access zone shall remain in place until the wall is adequately supported to prevent overturning and to prevent collapse unless the height of wall is over eight (8) feet, in which case, the limited access zone shall remain in place until the requirements of §36-23-37.7.2. have been met.

37.7.2. All masonry walls over eight (8) feet in height shall be adequately braced to prevent overturning and to prevent collapse unless the wall is adequately supported so that it will not overturn or collapse. The bracing shall remain in place until permanent supporting elements of the structure are

in place.

### 37.1. General provisions:

~~—— (a) General. All equipment and materials used in concrete construction and masonry work shall meet the applicable requirements for design, construction, inspection, testing, maintenance and operations as prescribed in ANSI A10.9-1970, Safety Requirements for Concrete Construction and Masonry Work.~~

~~—— (b) Reinforcing steel.~~

~~—— (1) Employees working more than six (6) feet above any adjacent working surfaces, placing and tying reinforcing steel in walls, piers, columns, etc., shall be provided with a safety belt or equivalent device.~~

~~—— (2) Employees shall not be permitted to work above vertically protruding reinforcing steel unless it has been protected to eliminate the hazard of impalement.~~

~~—— (3) Guying. Reinforcing steel for walls, piers, columns, and similar vertical structures shall be guyed and supported to prevent collapse.~~

~~—— (4) Wire mesh rolls. Wire mesh rolls shall be secured at each end to prevent dangerous recoiling action.~~

~~—— (c) Bulk concrete handling. Bulk storage bins, containers, or silos shall have conical or tapered bottoms with mechanical or pneumatic means of starting the flow of material.~~

~~—— (d) Concrete placement:~~

~~—— (1) Concrete mixers. Concrete mixers equipped with one (1) yard or larger loading skips shall be equipped with a mechanical device to clear the skip of material.~~

~~—— (2) Guardrails. Mixers of one (1) year capacity or greater shall be equipped with protective guardrails installed on each side of the skip.~~

~~—— (3) Bull floats. Handles on bull floats, used where they may contact energized electrical conductors, shall be constructed of nonconductive material, or insulated with nonconductive sheath whose electrical and mechanical characteristics provide the equivalent protection of a handle constructed of nonconductive material.~~

~~—— (4) Powered concrete trowels. Powered and rotating type concrete troweling machines that are manually guided shall be equipped with a control switch that will automatically shut off the power whenever the operator removes his hands from the equipment handles.~~

~~—— (5) Concrete buggies. Handles of buggies shall not extend beyond the wheels on either side of the buggy. Installation of knuckle guards on buggy handles is recommended.~~

~~—— (6) Pumpcrete systems. Pumpcrete or similar systems using discharge pipes shall be provided with pipe supports designed for one hundred (100) percent overload. Compressed air hose in such systems shall be provided with positive fail safe joint connectors to prevent separation of sections~~

when pressurized:

~~————— (7) Concrete buckets:~~

~~————— (i) Concrete buckets equipped with hydraulic or pneumatically operated gates shall have positive safety latches or similar safety devices installed to prevent aggregate and loose material from accumulating on the top and sides of the bucket:~~

~~————— (ii) Riding of concrete buckets for any purpose shall be prohibited, and vibrator crews and all other persons shall be kept out from under concrete buckets suspended from cranes or cableways:~~

~~————— (8) When discharging on a slope, the wheels of a ready-mix trucks shall be blocked and the brakes set to prevent movement:~~

~~————— (9) Nozzlement applying a cement, sand, and water mixture through a pneumatic hose shall be required to wear protective head and face equipment:~~

~~————— (e) Vertical shoring:~~

~~————— (1) General requirements:~~

~~————— (i) When temporary storage of reinforcing rods, material, or equipment on top of formwork becomes necessary, these areas shall be strengthened to meet the intended loads:~~

~~————— (ii) The sills or shoring shall be sound, rigid, and capable of carrying the maximum intended load:~~

~~————— (iii) All shoring equipment shall be inspected prior to erection to determine that it is as specified in the shoring layout. Any equipment found to be damaged shall not be used for shoring:~~

~~————— (iv) Erected shoring equipment shall be inspected immediately prior to, during, and immediately after the placement of concrete. Any shoring equipment that is found to be damaged or weakened shall be immediately reinforced or reshored:~~

~~————— (v) Reshoring shall be provided when necessary to safely support slabs and beams after stripping, or where such members are subjected to super-imposed loads due to construction work done:~~

~~————— (2) Tubular welded frame shoring:~~

~~————— (i) Metal tubular frames used for shoring shall not be loaded beyond the safe working load recommended by the manufacturer:~~

~~————— (ii) All locking devices on frames and braces shall be in good working order; coupling pins shall align the frame or panel legs; pivoted cross-bracers shall have their center pivot in place; and all components shall be in a condition similar to that of original manufacturer:~~

~~————— (iii) When checking the erected shoring frames with the shoring layout, the spacing between towers and cross-brace spacing shall not exceed that shown on the layout, and all locking devices shall be in the closed position:~~

~~————— (iv) Devices for attaching the external lateral stability bracing shall be securely fastened to the legs of the shoring frames.~~

~~————— (v) All baseplates, shore heads, extension devices, or adjustment screws shall be in firm contact with the footing sill and the form.~~

### ~~37.2. Forms and shoring:~~

~~————— (a) General provisions:~~

~~————— (1) Formwork and shoring shall be designed, erected, supported, braced, and maintained so that it will safely support all vertical and lateral loads that may be imposed upon it during placement of concrete.~~

~~————— (2) Drawings or plans showing the jack layout, formwork, shoring, working decks, and scaffolding, shall be available at the jobsite.~~

~~————— (3) Stripped forms and shoring shall be removed and stockpiled promptly after stripping in all areas in which persons are required to work or pass. Protruding nails, wire ties, and other form accessories not necessary to subsequent work shall be pulled, cut, or other means taken to eliminate the hazard.~~

~~————— (4) Imposition of any construction loads on the partially completed structure shall not be permitted unless such loading has been considered in the design and approved by the engineer-architect.~~

~~————— (b) Vertical slip forms:~~

~~————— (1) The steel rods or pipe on which the jacks climb or by which the forms are lifted shall be specifically designed for the purpose. Such rods shall be adequately braced where not encased in concrete.~~

~~————— (2) Jacks and vertical supports shall be positioned in such a manner that the vertical loads are distributed equally and do not exceed the capacity of the jacks.~~

~~————— (3) The jacks or other lifting devices shall be provided with mechanical dogs or other automatic holding devices to provide protection in case of failure of the power supply or the lifting mechanism.~~

~~————— (4) Lifting shall proceed steadily and uniformly and shall not exceed the predetermined safe rate of lift.~~

~~————— (5) Lateral and diagonal bracing of the forms shall be provided to prevent excessive distortion of the structure during the jacking operation.~~

~~————— (6) During jacking operations, the form structure shall be maintained in line and plumb.~~

~~————— (7) All vertical lift forms shall be provided with scaffolding or work platforms completely encircling the area of placement.~~

~~———— (c) Tube and coupler shoring:~~

~~———— (1) Couplers (clamps) shall not be used if they are deformed, broken, or have defective or missing threads on bolts, or other defects:~~

~~———— (2) The material used for the couplers (clamps) shall be of a structural type such as drop-forged steel, malleable iron, or structural grade aluminum. Gray cast iron shall not be used:~~

~~———— (3) When checking the erected shoring towers with the shoring layout, the spacing between posts shall not exceed that shown on the layout, and all interlocking of tubular members and tightness of couples shall be checked:~~

~~———— (4) All baseplates, shore heads, extension devices, or adjustment screws shall be in firm contact with the footing sill and the form material and shall be snug against the posts:~~

~~———— (d) Single post shores:~~

~~———— (1) For stability, single post shores shall be horizontally braced in both the longitudinal and transverse directions, and diagonal bracing shall also be installed. Such bracing shall be installed as the shores are being erected:~~

~~———— (2) All baseplates or shore heads of single post shores shall be in firm contact with the footing sill and the form materials:~~

~~———— (3) Whenever single post shores are used in more than one (1) tier, the layout shall be designed and inspected by structural engineer:~~

~~———— (4) When formwork is at an angle, or sloping, or when the surfaces shored is sloping, the shoring shall be designed for such loading:~~

~~———— (5) Adjustment of single post shores to raise formwork shall not be made after concrete is in place:~~

~~———— (6) Fabricated single post shores shall not be used if heavily rusted, bent, dented, rewelded, or having broken weldments or other defects. If they contain timber, they shall not be used if the timber is split, cut, has sections removed, is rotted, or otherwise structurally damaged:~~

~~———— (7) All timber and adjusting devices to be used for adjustable timber single post shores shall be inspected before erection:~~

~~———— (8) Timber shall not be used if it is split, cut, has sections removed, is rotted, or is otherwise structurally damaged:~~

~~———— (9) Adjusting devices shall not be used if heavily rusted, bent, dented, rewelded, or having broken weldments or other defects:~~

~~———— (10) All nails used to secure bracing or adjustable timber single post shores shall be driven home and the point of the nail bent over if possible:~~

37.3. Definitions applicable to this subsection:

- ~~—— (a) “Bull Float” A tool used to spread out and smooth the concrete.~~
- ~~—— (b) “Formwork” or “Falsework” The total system of support for freshly placed concrete, including the mold sheathing which contacts the concrete as well as all supporting members, hardware, and necessary bracing.~~
- ~~—— (c) “Guy” A line that steadies a high piece or structure by pulling against an off-center load.~~
- ~~—— (d) “Shore” A supporting member that resists a compressive force imposed by a load.~~
- ~~—— (e) “Vertical slip forms” forms which are jacked vertically and continuously during placing of the concrete.~~

### **§36-23-38. Steel Erection.**

#### 38.1. Definitions applicable to this Section.

38.1.1. “Anchored bridging” shall mean that the steel joist bridging is connected to a bridging terminus point.

38.1.2. “Bolted diagonal bridging” shall mean diagonal bridging that is bolted to a steel joist or joists.

38.1.3. “Bridging clip” shall mean a device that is attached to the steel joist to allow the bolting of the bridging to the steel joist.

38.1.4. “Bridging terminus point” shall mean a wall, a beam, tandem joists (with all bridging installed and a horizontal truss in the plane of the top chord) or other element at an end or intermediate point(s) of a line of bridging that provides an anchor point for the steel joist bridging.

38.1.5. “Choker” shall mean a wire rope or synthetic fiber rigging assembly that is used to attach a load to a hoisting device.

38.1.6. “Cold forming” shall mean the process of using press brakes, rolls, or other methods to shape steel into desired cross sections at room temperature.

38.1.7. “Column” shall mean a load-carrying vertical member that is part of the primary skeletal framing system. Columns do not include posts.

38.1.8. “Competent person” shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

38.1.9. “Connector” shall mean an employee who, working with hoisting equipment, is placing and connecting structural members and/or components.

38.1.10. “Constructability” shall mean the ability to erect structural steel members in accordance with OSHA §1926 Subpart R without having to alter the over-all structural design.

38.1.11. "Construction load" (for joist erection) shall mean any load other than the weight of the employee(s), the joists and the bridging bundle.

38.1.12. "Controlled decking zone" ("CDZ") shall mean an area in which certain work (for example, initial installation and placement of metal decking) may take place without the use of guardrail systems, personal fall arrest systems, fall restraint systems, or safety net systems and where access to the zone is controlled.

38.1.13. "Controlled load lowering" shall mean lowering a load by means of a mechanical hoist drum device that allows a hoisted load to be lowered with maximum control using the gear train or hydraulic components of the hoist mechanism. Controlled load lowering requires the use of the hoist drive motor, rather than the load hoist brake, to lower the load.

38.1.14. "Controlling contractor" shall mean a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project -- its planning, quality and completion.

38.1.15. "Critical lift" shall mean a lift that (1) exceeds seventy-five (75) percent of the rated capacity of the crane or derrick, or (2) requires the use of more than one (1) crane or derrick.

38.1.16. "Decking hole" shall mean a gap or void more than two (2) inches in its least dimension and less than twelve (12) inches in its greatest dimension in a floor, roof or other walking/working surface. Pre-engineered holes in cellular decking (for wires, cables, etc.) are not included in this definition.

38.1.17. "Derrick floor" shall mean an elevated floor of a building or structure that has been designated to receive hoisted pieces of steel prior to final placement.

38.1.18. "Double connection" shall mean an attachment method where the connection point is intended for two (2) pieces of steel which share common bolts on either side of a central piece.

38.1.19. "Double connection seat" shall mean a structural attachment that, during the installation of a double connection, supports the first member while the second member is connected.

38.1.20. "Erection bridging" shall mean the bolted diagonal bridging that is required to be installed prior to releasing the hoisting cables from the steel joists.

38.1.21. "Fall restraint system" shall mean a fall protection system that prevents the user from falling any distance. The system is comprised of either a body belt or body harness, along with an anchorage, connectors and other necessary equipment. The other components typically include a lanyard, and may also include a lifeline and other devices.

38.1.22. "Final interior perimeter" shall mean the perimeter of a large permanent open space within a building such as an atrium or courtyard. This does not include openings for stairways, elevator shafts, etc.

38.1.23. "Girt" (in systems-engineered metal buildings) shall mean a "Z" or "C" shaped member formed from sheet steel spanning between primary framing and supporting wall material.

38.1.24. "Headache ball" shall mean a weighted hook that is used to attach loads to the hoist

load line of the crane.

38.1.25. "Hoisting equipment" shall mean commercially manufactured lifting equipment designed to lift and position a load of known weight to a location at some known elevation and horizontal distance from the equipment's center of rotation. "Hoisting equipment" includes but is not limited to cranes, derricks, tower cranes, barge-mounted derricks or cranes, gin poles and gantry hoist systems. A "come-a-long" (a mechanical device, usually consisting of a chain or cable attached at each end, that is used to facilitate movement of materials through leverage) is not considered "hoisting equipment."

38.1.26. "Leading edge" shall mean the unprotected side and edge of a floor, roof, or formwork for a floor or other walking/working surface (such as deck) which changes location as additional floor, roof, decking or formwork sections are placed, formed or constructed.

38.1.27. "Metal decking" shall mean a commercially manufactured, structural grade, cold rolled metal panel formed into a series of parallel ribs; for this Section, this includes metal floor and roof decks, standing seam metal roofs, other metal roof systems and other products such as bar gratings, checker plate, expanded metal panels, and similar products. After installation and proper fastening, these decking materials serve a combination of functions including, but not limited to: a structural element designed in combination with the structure to resist, distribute and transfer loads, stiffen the structure and provide a diaphragm action; a walking/working surface; a form for concrete slabs; a support for roofing systems; and a finished floor or roof.

38.1.28. "Multiple lift rigging" shall mean a rigging assembly manufactured by wire rope rigging suppliers that facilitates the attachment of up to five (5) independent loads to the hoist rigging of a crane.

38.1.29. "Opening" shall mean a gap or void twelve (12) inches or more in its least dimension in a floor, roof or other walking/working surface. For the purposes of this Section, skylights and smoke domes that do not meet the strength requirements of §36-23-38.5.5.c. (covering roof and floor openings) shall be regarded as openings.

38.1.30. "Permanent floor" shall mean a structurally completed floor at any level or elevation (including slab on grade).

38.1.31. "Personal fall arrest system" shall mean a system used to arrest an employee in a fall from a working level. A personal fall arrest system consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these. The use of a body belt for fall arrest is prohibited.

38.1.32. "Positioning device system" shall mean a body belt or body harness rigged to allow an employee to be supported on an elevated, vertical surface, such as a wall or column and work with both hands free while leaning.

38.1.33. "Post" shall mean a structural member with a longitudinal axis that is essentially vertical, that: (1) weighs three hundred (300) pounds or less and is axially loaded (a load presses down on the top end), or (2) is not axially loaded, but is laterally restrained by the above member. Posts typically support stair landings, wall framing, mezzanines and other substructures.

38.1.34. "Project structural engineer of record" shall mean the registered, licensed professional

responsible for the design of structural steel framing and whose seal appears on the structural contract documents.

38.1.35. "Purlin" (in systems-engineered metal buildings) shall mean a "Z" or "C" shaped member formed from sheet steel spanning between primary framing and supporting roof material.

38.1.36. "Qualified person" shall mean one who, by possession of a recognized degree, certificate, or professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project.

38.1.37. "Safety deck attachment" shall mean an initial attachment that is used to secure an initially placed sheet of decking to keep proper alignment and bearing with structural support members.

38.1.38. "Shear connector" shall mean headed steel studs, steel bars, steel lugs, and similar devices which are attached to a structural member for the purpose of achieving composite action with concrete.

38.1.39. "Steel erection" shall mean the construction, alteration or repair of steel buildings, bridges and other structures, including the installation of metal decking and all planking used during the process of erection.

38.1.40. "Steel joist" shall mean an open web, secondary load-carrying member of one hundred forty-four (144) feet or less, designed by the manufacturer, used for the support of floors and roofs. This does not include structural steel trusses or cold-formed joists.

38.1.41. "Steel joist girder" shall mean an open web, primary load-carrying member, designed by the manufacturer, used for the support of floors and roofs. This does not include structural steel trusses.

38.1.42. "Steel truss" shall mean an open web member designed of structural steel components by the project structural engineer of record. For the purposes of this Section, a steel truss is considered equivalent to a solid web structural member.

38.1.43. "Structural steel" shall mean a steel member, or a member made of a substitute material (such as, but not limited to, fiberglass, aluminum or composite members). These members include, but are not limited to, steel joists, joist girders, purlins, columns, beams, trusses, splices, seats, metal decking, girts, and all bridging, and cold formed metal framing which is integrated with the structural steel framing of a building.

38.1.44. "Systems-engineered metal building" shall mean a metal, field-assembled building system consisting of framing, roof and wall coverings. Typically, many of these components are cold-formed shapes. These individual parts are fabricated in one or more manufacturing facilities and shipped to the job site for assembly into the final structure. The engineering design of the system is normally the responsibility of the systems-engineered metal building manufacturer.

38.1.45. "Tank" shall mean a container for holding gases, liquids or solids.

38.1.46. "Unprotected sides and edges" shall mean any side or edge (except at entrances to points of access) of a walking/working surface, for example a, floor, roof, ramp or runway, where there

is no wall or guardrail system at least thirty-nine (39) inches high.

38.2. Training.

38.2.1. Training personnel. Training required by this Section shall be provided by a qualified person(s).

38.2.2. Fall hazard training. The employer shall train each employee exposed to a fall hazard in accordance with the requirements of this Section. The employer shall institute a training program and ensure employee participation in the program. The program shall include training and instruction in the following areas:

38.2.2.a. The recognition and identification of fall hazards in the work area;

38.2.2.b. The use and operation of guardrail systems (including perimeter safety cable systems), personal fall arrest systems, positioning device systems, fall restraint systems, safety net systems, and other protection to be used;

38.2.2.c. The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;

38.2.2.d. The procedures to be followed to prevent falls to lower levels and through or into holes and openings in walking/working surfaces and walls; and

38.2.2.e. The fall protection requirements of this Section (§36-23-38.11.)

38.2.3. Special training programs. In addition to the training requirements in §§36-23-38.2.1. and 36-23-38.2.2., the employer shall provide special training to employees engaged in the following activities:

38.2.3.a. Multiple lift rigging procedure. The employer shall ensure that each employee who performs multiple lift rigging has been provided training in the following areas:

38.2.3.a.1. The nature of the hazards associated with multiple lifts; and

38.2.3.a.2. The proper procedures and equipment to perform multiple lifts required by §36-23-38.4.5. (multiple lift rigging procedure).

38.2.3.b. Connector procedures. The employer shall ensure that each connector has been provided training in the following areas:

38.2.3.b.1. The nature of the hazards associated with connecting; and

38.2.3.b.2. The establishment, access, proper connecting techniques and work practices required by §36-23-38.7.3. (double connectors) and §36-23-38.11.2. (connectors).

38.2.3.c. Controlled Decking Zone Procedures. Where CDZs are being used, the employer shall assure that each employee has been provided training in the following areas:

38.2.3.c.1. The nature of the hazards associated with work within a controlled decking

zone; and

38.2.3.c.2. The establishment, access, proper installation techniques and work practices required by §36-23-38.11.3. (controlled decking zone (CDZ)) and §36-23-38.5.5. (metal decking).

### 38.3. Site layout, site-specific erection plan and construction sequence.

38.3.1. Approval to begin steel erection. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the following written notifications:

38.3.1.a. The concrete in the footings, piers and walls and the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either seventy-five (75) percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

38.3.1.b. Any repairs, replacements and modifications to the anchor bolts were conducted in accordance with §38-23-38.6.2. (field modification of anchor bolts).

38.3.2. Commencement of steel erection. A steel erection contractor shall not erect steel unless it has received written notification that the concrete in the footings, piers and walls or the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either seventy-five (75) percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

38.3.3. Site layout. The controlling contractor shall ensure that the following is provided and maintained:

38.3.3.a. Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, and the material to be erected and means and methods for pedestrian and vehicular control. Exception: this requirement does not apply to roads outside of the construction site.

38.3.3.b. A firm, properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and the safe operation of the erector's equipment.

38.3.4. Pre-planning of overhead hoisting operations. All hoisting operations in steel erection shall be pre-planned to ensure that the requirements of §36-23-38.4.4. (working under loads) are met.

38.3.5. Site-specific erection plan. Where employers elect, due to conditions specific to the site, to develop alternate means and methods that provide employee protection in accordance with §§36-23-38.4.3.e, 36-23-38.8.1.d. or 36-23-38.8.5.d., a site-specific erection plan shall be developed by a qualified person and be available at the work site.

### 38.4. Hoisting and rigging.

38.4.1. All the provisions of §36-23-42 apply to hoisting and rigging with the exception of §36-23-42.31.2.

38.4.2. In addition, §§36-23-38.4.3. through 36-23-38.4.5. apply regarding the hazards

associated with hoisting and rigging.

### 38.4.3. General.

#### 38.4.3.a. Pre-shift visual inspection of cranes.

38.4.3.a.1. Cranes being used in steel erection activities shall be visually inspected prior to each shift by a competent person; the inspection shall include observation for deficiencies during operation. At a minimum this inspection shall include the following:

38.4.3.a.1.A. All control mechanisms for maladjustments;

38.4.3.a.1.B. Control and drive mechanism for excessive wear of components and contamination by lubricants, water or other foreign matter;

38.4.3.a.1.C. Safety devices, including but not limited to boom angle indicators, boom stops, boom kick out devices, anti-two block devices, and load moment indicators where required;

38.4.3.a.1.D. Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation;

38.4.3.a.1.E. Hooks and latches for deformation, chemical damage, cracks, or wear;

38.4.3.a.1.F. Wire rope reeving for compliance with hoisting equipment manufacturer's specifications;

38.4.3.a.1.G. Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, or moisture accumulation;

38.4.3.a.1.H. Hydraulic system for proper fluid level;

38.4.3.a.1.I. Tires for proper inflation and condition;

38.4.3.a.1.J. Ground conditions around the hoisting equipment for proper support, including ground settling under and around outriggers, ground water accumulation, or similar conditions;

38.4.3.a.1.K. The hoisting equipment for level position; and

38.4.3.a.1.L. The hoisting equipment for level position after each move and setup.

38.4.3.a.2. If any deficiency is identified, an immediate determination shall be made by the competent person as to whether the deficiency constitutes a hazard.

38.4.3.a.3. If the deficiency is determined to constitute a hazard, the hoisting equipment shall be removed from service until the deficiency has been corrected.

38.4.3.a.4. The operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle loads until safety has been assured.

38.4.3.b. A qualified rigger (a rigger who is also a qualified person) shall inspect the rigging prior to each shift.

38.4.3.c. The headache ball, hook or load shall not be used to transport personnel except as provided in §36-23-38.4.3.d.

38.4.3.d. Cranes or derricks may be used to hoist employees on a personnel platform when work under this Section is being conducted, provided that all provisions of Subsections 36-23-42.31.3. through 36-23-42.31.17. (except for §36-23-42.31.2.) are met.

38.4.3.e. Safety latches on hooks shall not be deactivated or made inoperable except:

38.4.3.e.1. When a qualified rigger has determined that the hoisting and placing of purlins and single joists can be performed more safely by doing so; or

38.4.3.e.2. When equivalent protection is provided in a site-specific erection plan.

38.4.4. Working under loads.

38.4.4.a. Routes for suspended loads shall be pre-planned to ensure that no employee is required to work directly below a suspended load except for:

38.4.4.a.1. Employees engaged in the initial connection of the steel; or

38.4.4.a.2. Employees necessary for the hooking or unhooking of the load.

38.4.4.b. When working under suspended loads, the following criteria shall be met:

38.4.4.b.1. Materials being hoisted shall be rigged to prevent unintentional displacement;

38.4.4.b.2. Hooks with self-closing safety latches or their equivalent shall be used to prevent components from slipping out of the hook; and

38.4.4.b.3. All loads shall be rigged by a qualified rigger

38.4.5. Multiple lift rigging procedure.

38.4.5.a. A multiple lift shall only be performed if the following criteria are met:

38.4.5.a.1. A multiple lift rigging assembly is used;

38.4.5.a.2. A maximum of five (5) members are hoisted per lift;

38.4.5.a.3. Only beams and similar structural members are lifted; and

38.4.5.a.4. All employees engaged in the multiple lift have been trained in these procedures in accordance with §36-23-38.2.3.a. (multiple lift rigging procedure).

38.4.5.b. No crane is permitted to be used for a multiple lift where such use is contrary to

the manufacturer's specifications and limitations.

38.4.5.c. Components of the multiple lift rigging assembly shall be specifically designed and assembled with a maximum capacity for total assembly and for each individual attachment point. This capacity, certified by the manufacturer or a qualified rigger, shall be based on the manufacturer's specifications with a five to one (5:1) safety factor for all components.

38.4.5.d. The total load shall not exceed:

38.4.5.d.1. The rated capacity of the hoisting equipment specified in the hoisting equipment load charts;

38.4.5.d.2. The rigging capacity specified in the rigging rating chart.

38.4.5.e. The multiple lift rigging assembly shall be rigged with members:

38.4.5.e.1. Attached at their center of gravity and maintained reasonably level;

38.4.5.e.2. Rigged from top down; and

38.4.5.e.3. Rigged at least seven (7) feet apart.

38.4.5.f. The members on the multiple lift rigging assembly shall be set from the bottom up.

38.4.5.g. Controlled load lowering shall be used whenever the load is over the connectors.

### 38.5. Structural steel assembly.

38.5.1. Structural stability shall be maintained at all times during the erection process.

38.5.2. The following additional requirements shall apply for multi-story structures:

38.5.2.a. The permanent floors shall be installed as the erection of structural members progresses, and there shall be not more than eight (8) stories between the erection floor and the upper-most permanent floor, except where the structural integrity is maintained as a result of the design.

38.5.2.b. At no time shall there be more than four (4) floors or forty-eight (48) feet, whichever is less, of unfinished bolting or welding above the foundation or uppermost permanently secured floor, except where the structural integrity is maintained as a result of the design.

38.5.2.c. A fully planked or decked floor or nets shall be maintained within two (2) stories or thirty (30) feet, whichever is less, directly under any erection work being performed.

38.5.3. Walking/working surfaces -- shear connectors and other similar devices.

38.5.3.a. Tripping hazards. Shear connectors (such as headed steel studs, steel bars or steel lugs), reinforcing bars, deformed anchors or threaded studs shall not be attached to the top flanges of beams, joists or beam attachments so that they project vertically from or horizontally across the top flange of the member until after the metal decking, or other walking/working surface, has been

installed.

38.5.3.b. Installation of shear connectors on composite floors, roofs and bridge decks. When shear connectors are used in construction of composite floors, roofs and bridge decks, employees shall lay out and install the shear connectors after the metal decking has been installed, using the metal decking as a working platform. Shear connectors shall not be installed from within a controlled decking zone (CDZ), as specified in §36-23-38.11.3.g.

38.5.4. Plumbing-up.

38.5.4.a. When deemed necessary by a competent person, plumbing-up equipment shall be installed in conjunction with the steel erection process to ensure the stability of the structure.

38.5.4.b. When used, plumbing-up equipment shall be in place and properly installed before the structure is loaded with construction material such as loads of joists, bundles of decking or bundles of bridging.

38.5.4.c. Plumbing-up equipment shall be removed only with the approval of a competent person.

38.5.5. Metal decking.

38.5.5.a. Hoisting, landing and placing of metal decking bundles.

38.5.5.a.1. Bundle packaging and strapping shall not be used for hoisting unless specifically designed for that purpose.

38.5.5.a.2. If loose items such as dunnage, flashing, or other materials are placed on the top of metal decking bundles to be hoisted, such items shall be secured to the bundles.

38.5.5.a.3. Bundles of metal decking on joists shall be landed in accordance with §36-23-38.8.5.d.

38.5.5.a.4. Metal decking bundles shall be landed on framing members so that enough support is provided to allow the bundles to be unbanded without dislodging the bundles from the supports.

38.5.5.a.5. At the end of the shift or when environmental or jobsite conditions require, metal decking shall be secured against displacement.

38.5.5.b. Roof and floor holes and openings. Metal decking at roof and floor holes and openings shall be installed as follows:

38.5.5.b.1. Framed metal deck openings shall have structural members turned down to allow continuous deck installation except where not allowed by structural design constraints or constructability.

38.5.5.b.2. Roof and floor holes and openings shall be decked over. Where large size, configuration or other structural design does not allow openings to be decked over (such as elevator shafts, stair wells, etc.) employees shall be protected in accordance with §36-23-38.11.1.a.

38.5.5.b.3. Metal decking holes and openings shall not be cut until immediately prior to being permanently filled with the equipment or structure needed or intended to fulfill its specific use and which meets the strength requirements of §36-23-38.5.5.c., or shall be immediately covered.

38.5.5.c. Covering roof and floor openings.

38.5.5.c.1. Covers for roof and floor openings shall be capable of supporting, without failure, twice the weight of the employees, equipment and materials that may be imposed on the cover at any one time.

38.5.5.c.2. All covers shall be secured when installed to prevent accidental displacement by the wind, equipment or employees.

38.5.5.c.3. All covers shall be painted with high-visibility paint or shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

38.5.5.c.4. Smoke dome or skylight fixtures that have been installed, are not considered covers for the purpose of this Section unless they meet the strength requirements of §36-23-38.5.5.c.1.

38.5.5.d. Decking gaps around columns. Wire mesh, exterior plywood, or equivalent, shall be installed around columns where planks or metal decking do not fit tightly. The materials used must be of sufficient strength to provide fall protection for personnel and prevent objects from falling through.

38.5.5.e. Installation of metal decking.

38.5.5.e.1. Except as provided in §36-23-38.11.3. (controlled decking zone (CDZ)), metal decking shall be laid tightly and immediately secured upon placement to prevent accidental movement or displacement.

38.5.5.e.2. During initial placement, metal decking panels shall be placed to ensure full support by structural members.

38.5.5.f. Derrick floors.

38.5.5.f.1. A derrick floor shall be fully decked and/or planked and the steel member connections completed to support the intended floor loading.

38.5.5.f.2. Temporary loads placed on a derrick floor shall be distributed over the underlying support members so as to prevent local overloading of the deck material.

38.6. Column anchorage.

38.6.1. General requirements for erection stability.

38.6.1.a. All columns shall be anchored by a minimum of four (4) anchor rods (anchor bolts).

38.6.1.b. Each column anchor rod (anchor bolt) assembly, including the column-to-base plate weld and the column foundation, shall be designed to resist a minimum eccentric gravity load of three hundred (300) pounds located eighteen (18) inches from the extreme outer face of the column in

each direction at the top of the column shaft.

38.6.1.c. Columns shall be set on level finished floors, pre-grouted leveling plates, leveling nuts, or shim packs which are adequate to transfer the construction loads.

38.6.1.d. All columns shall be evaluated by a competent person to determine whether guying or bracing is needed; if guying or bracing is needed, it shall be installed.

38.6.2. Repair, replacement or field modification of anchor rods (anchor bolts).

38.6.2.a. Anchor rods (anchor bolts) shall not be repaired, replaced or field-modified without the approval of the project structural engineer of record.

38.6.2.b. Prior to the erection of a column, the controlling contractor shall provide written notification to the steel erector if there has been any repair, replacement or modification of the anchor rods (anchor bolts) of that column.

38.7. Beams and columns.

38.7.1. General.

38.7.1.a. During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with at least two (2) bolts per connection, of the same size and strength as shown in the erection drawings, drawn up wrench-tight or the equivalent as specified by the project structural engineer of record, except as specified in §36-23-38.7.2.

38.7.1.b. A competent person shall determine if more than two (2) bolts are necessary to ensure the stability of cantilevered members; if additional bolts are needed, they shall be installed.

38.7.2. Diagonal bracing. Solid web structural members used as diagonal bracing shall be secured by at least one (1) bolt per connection drawn up wrench-tight or the equivalent as specified by the project structural engineer of record.

38.7.3. Double connections.

38.7.3.a. Double connections at columns and/or at beam webs over a column. When two (2) structural members on opposite sides of a column web, or a beam web over a column, are connected sharing common connection holes, at least one (1) bolt with its wrench-tight nut shall remain connected to the first member unless a shop-attached or field-attached seat or equivalent connection device is supplied with the member to secure the first member and prevent the column from being displaced.

38.7.3.b. If a seat or equivalent device is used, the seat (or device) shall be designed to support the load during the double connection process. It shall be adequately bolted or welded to both a supporting member and the first member before the nuts on the shared bolts are removed to make the double connection.

38.7.4. Column splices. Each column splice shall be designed to resist a minimum eccentric gravity load of three hundred (300) pounds located eighteen (18) inches from the extreme outer face of the column in each direction at the top of the column shaft.

38.7.5. Perimeter columns. Perimeter columns shall not be erected unless:

38.7.5.a. The perimeter columns extend a minimum of forty-eight (48) inches above the finished floor to permit installation of perimeter safety cables prior to erection of the next tier, except where constructability does not allow.

38.7.5.b. The perimeter columns have holes or other devices in or attached to perimeter columns at forty-two (42) to forty-five (45) inches above the finished floor and the midpoint between the finished floor and the top cable to permit installation of perimeter safety cables required by §36-23-38.11.1.b., except where constructability does not allow.

38.8. Open web steel joists.

38.8.1. General.

38.8.1.a. Except as provided in §36-23-38.8.1.b., where steel joists are used and columns are not framed in at least two (2) directions with solid web structural steel members, a steel joist shall be field-bolted at the column to provide lateral stability to the column during erection. For the installation of this joist:

38.8.1.a.1. A vertical stabilizer plate shall be provided on each column for steel joists. The plate shall be a minimum of six (6) inch by six (6) inch and shall extend at least three (3) inches below the bottom chord of the joist with a thirteenth-sixteenths (13/16) inch hole to provide an attachment point for guying or plumbing cables.

38.8.1.a.2. The bottom chords of steel joists at columns shall be stabilized to prevent rotation during erection.

38.8.1.a.3. Hoisting cables shall not be released until the seat at each end of the steel joist is field-bolted, and each end of the bottom chord is restrained by the column stabilizer plate.

38.8.1.b. Where constructability does not allow a steel joist to be installed at the column:

38.8.1.b.1. an alternate means of stabilizing joists shall be installed on both sides near the column and shall:

38.8.1.b.1.A. provide stability equivalent to §36-23-38.8.1.a.;

38.8.1.b.1.B. be designed by a qualified person;

38.8.1.b.1.C. be shop installed; and

38.8.1.b.1.D. be included in the erection drawings.

38.8.1.b.2. Hoisting cables shall not be released until the seat at each end of the steel joist is field-bolted and the joist is stabilized.

38.8.1.c. Where steel joists at or near columns span sixty (60) feet or less, the joists shall be designed with sufficient strength to allow one (1) employee to release the hoisting cable without the need for erection bridging.

38.8.1.d. Where steel joists at or near columns span more than sixty (60) feet, the joists shall be set in tandem with all bridging installed unless an alternative method of erection, which provides equivalent stability to the steel joist, is designed by a qualified person and is included in the site-specific erection plan.

38.8.1.e. A steel joist or steel joist girder shall not be placed on any support structure unless such structure is stabilized.

38.8.1.f. When steel joist(s) are landed on a structure, they shall be secured to prevent unintentional displacement prior to installation.

38.8.1.g. No modification that affects the strength of a steel joist or steel joist girder shall be made without the approval of the project structural engineer of record.

38.8.1.h. Field-bolted joists.

38.8.1.h.1. Except for steel joists that have been pre-assembled into panels, connections of individual steel joists to steel structures in bays of forty (40) feet or more shall be fabricated to allow for field bolting during erection.

38.8.1.h.2. These connections shall be field-bolted unless constructability does not allow.

38.8.1.i. Steel joists and steel joist girders shall not be used as anchorage points for a fall arrest system unless written approval to do so is obtained from a qualified person.

38.8.1.j. A bridging terminus point shall be established before bridging is installed.

38.8.2. Attachment of steel joists and steel joist girders.

38.8.2.a. Each end of "K" series steel joists shall be attached to the support structure with a minimum of two (2) one-eighth (1/8) inch fillet welds one (1) inch long or with two (2) half-inch (1/2) inch bolts, or the equivalent.

38.8.2.b. Each end of "LH" and "DLH" series steel joists and steel joist girders shall be attached to the support structure with a minimum of two (2) one-fourth (1/4) inch fillet welds two (2) inches long, or with two (2) three-fourth (3/4) inch bolts, or the equivalent.

38.8.2.c. Except as provided in §36-23-38.8.2.d., each steel joist shall be attached to the support structure, at least at one end on both sides of the seat, immediately upon placement in the final erection position and before additional joists are placed.

38.8.2.d. Panels that have been pre-assembled from steel joists with bridging shall be attached to the structure at each corner before the hoisting cables are released.

38.8.3. Erection of steel joists.

38.8.3.a. Both sides of the seat of one end of each steel joist that requires bridging under Tables 36-23I and 36-34J shall be attached to the support structure before hoisting cables are released.

38.8.3.b. For joists over sixty (60) feet, both ends of the joist shall be attached as specified in §36-23-38.8.2. and the provisions of §36-23-38.8.4. shall be met before the hoisting cables are released.

38.8.3.c. On steel joists that do not require erection bridging under Tables 36-23I and 36-23J, only one (1) employee shall be allowed on the joist until all bridging is installed and anchored.

Table 36-23I -- Erection Bridging for Short Span Joists

<u>Joist</u>	<u>Span</u>
<u>8L1</u>	<u>NM</u>
<u>10K1</u>	<u>NM</u>
<u>12K1</u>	<u>23-0</u>
<u>12K3</u>	<u>NM</u>
<u>12K5</u>	<u>NM</u>
<u>14K1</u>	<u>27-0</u>
<u>14K3</u>	<u>NM</u>
<u>14K4</u>	<u>NM</u>
<u>14K6</u>	<u>NM</u>
<u>16K2</u>	<u>29-0</u>
<u>16K3</u>	<u>30-0</u>
<u>16K4</u>	<u>32-0</u>
<u>16K5</u>	<u>32-0</u>
<u>16K6</u>	<u>NM</u>
<u>16K7</u>	<u>NM</u>
<u>16K9</u>	<u>NM</u>
<u>18K3</u>	<u>31-0</u>
<u>18K4</u>	<u>32-0</u>
<u>18K5</u>	<u>33-0</u>
<u>18K6</u>	<u>35-0</u>
<u>18K7</u>	<u>NM</u>
<u>18K9</u>	<u>NM</u>
<u>18K10</u>	<u>NM</u>
<u>20K3</u>	<u>32-0</u>

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<u>Joist</u>	<u>Span</u>
<u>20K4</u>	<u>34-0</u>
<u>20K5</u>	<u>34-0</u>
<u>20K6</u>	<u>36-0</u>
<u>20K7</u>	<u>39-0</u>
<u>20K9</u>	<u>39-0</u>
<u>20K10</u>	<u>NM</u>
<u>22K4</u>	<u>34-0</u>
<u>22K5</u>	<u>35-0</u>
<u>22K6</u>	<u>36-0</u>
<u>22K7</u>	<u>40-0</u>
<u>22K9</u>	<u>40-0</u>
<u>22K10</u>	<u>40-0</u>
<u>22K11</u>	<u>40-0</u>
<u>24K4</u>	<u>36-0</u>
<u>24K5</u>	<u>38-0</u>
<u>24K6</u>	<u>39-0</u>
<u>24K7</u>	<u>43-0</u>
<u>24K8</u>	<u>43-0</u>
<u>24K9</u>	<u>44-0</u>
<u>24K10</u>	<u>NM</u>
<u>24K12</u>	<u>NM</u>
<u>26K5</u>	<u>38-0</u>
<u>26K6</u>	<u>39-0</u>
<u>26K7</u>	<u>43-0</u>
<u>26K8</u>	<u>44-0</u>
<u>26K9</u>	<u>45-0</u>
<u>26K10</u>	<u>49-0</u>
<u>26K12</u>	<u>NM</u>
<u>28K6</u>	<u>40-0</u>

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<u>Joist</u>	<u>Span</u>
<u>28K7</u>	<u>43-0</u>
<u>28K8</u>	<u>44-0</u>
<u>28K9</u>	<u>45-0</u>
<u>28K10</u>	<u>49-0</u>
<u>28K12</u>	<u>53-0</u>
<u>30K7</u>	<u>44-0</u>
<u>30K8</u>	<u>45-0</u>
<u>30K9</u>	<u>45-0</u>
<u>30K10</u>	<u>50-0</u>
<u>30K11</u>	<u>52-0</u>
<u>30K12</u>	<u>54-0</u>
<u>10KCS1</u>	<u>NM</u>
<u>10KCS2</u>	<u>NM</u>
<u>10KCS3</u>	<u>NM</u>
<u>12KCS1</u>	<u>NM</u>
<u>12KCS2</u>	<u>NM</u>
<u>12KCS3</u>	<u>NM</u>
<u>14KCS1</u>	<u>NM</u>
<u>14KCS2</u>	<u>NM</u>
<u>14KCS3</u>	<u>NM</u>
<u>16KCS2</u>	<u>NM</u>
<u>16KCS3</u>	<u>NM</u>
<u>16KCS4</u>	<u>NM</u>
<u>16KCS5</u>	<u>NM</u>
<u>18KCS2</u>	<u>35-0</u>
<u>18KCS3</u>	<u>NM</u>
<u>18KCS4</u>	<u>NM</u>
<u>18KCS5</u>	<u>NM</u>
<u>20KCS2</u>	<u>36-0</u>

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<u>Joist</u>	<u>Span</u>
<u>20KCS3</u>	<u>39-0</u>
<u>20KCS4</u>	<u>NM</u>
<u>20KCS5</u>	<u>NM</u>
<u>22KCS2</u>	<u>36-0</u>
<u>22KCS3</u>	<u>40-0</u>
<u>22KCS4</u>	<u>NM</u>
<u>22KCS5</u>	<u>NM</u>
<u>24KCS2</u>	<u>39-0</u>
<u>24KCS3</u>	<u>44-0</u>
<u>24KCS4</u>	<u>NM</u>
<u>24KCS5</u>	<u>NM</u>
<u>26KCS2</u>	<u>39-0</u>
<u>26KCS3</u>	<u>44-0</u>
<u>26KCS4</u>	<u>NM</u>
<u>26KCS5</u>	<u>NM</u>
<u>28KCS2</u>	<u>40-0</u>
<u>28KCS3</u>	<u>45-0</u>
<u>28KCS4</u>	<u>53-0</u>
<u>28KCS5</u>	<u>53-0</u>
<u>30KCS3</u>	<u>45-0</u>
<u>30KCS4</u>	<u>54-0</u>
<u>30KCS5</u>	<u>54-0</u>

Table 36-23J -- Erection Bridging for Long Span Joists

<u>Joist</u>	<u>Span</u>
<u>18LH02</u>	<u>33-0</u>
<u>18LH03</u>	<u>NM</u>
<u>18LH04</u>	<u>NM</u>
<u>18LH05</u>	<u>NM</u>

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<u>Joist</u>	<u>Span</u>
<u>18LH06</u>	<u>NM</u>
<u>18LH07</u>	<u>NM</u>
<u>18LH08</u>	<u>NM</u>
<u>18LH09</u>	<u>NM</u>
<u>20LH02</u>	<u>33-0</u>
<u>20LH03</u>	<u>38-0</u>
<u>20LH04</u>	<u>NM</u>
<u>20LH05</u>	<u>NM</u>
<u>20LH06</u>	<u>NM</u>
<u>20LH07</u>	<u>NM</u>
<u>20LH08</u>	<u>NM</u>
<u>20LH09</u>	<u>NM</u>
<u>20LH10</u>	<u>NM</u>
<u>24LH03</u>	<u>35-0</u>
<u>24LH04</u>	<u>39-0</u>
<u>24LH05</u>	<u>40-0</u>
<u>24LH06</u>	<u>45-0</u>
<u>24LH07</u>	<u>NM</u>
<u>24LH08</u>	<u>NM</u>
<u>24LH09</u>	<u>NM</u>
<u>24LH10</u>	<u>NM</u>
<u>24LH11</u>	<u>NM</u>
<u>28LH05</u>	<u>42-0</u>
<u>28LH06</u>	<u>46-0</u>
<u>28LH07</u>	<u>NM</u>
<u>28LH08</u>	<u>NM</u>
<u>28LH09</u>	<u>NM</u>
<u>28LH10</u>	<u>NM</u>
<u>28LH11</u>	<u>NM</u>

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<u>Joist</u>	<u>Span</u>
<u>28LH12</u>	<u>NM</u>
<u>28LH13</u>	<u>NM</u>
<u>32LH06</u>	<u>47-0 through 60-0</u>
<u>32LH07</u>	<u>47-0 through 60-0</u>
<u>32LH08</u>	<u>55-0 through 60-0</u>
<u>32LH09</u>	<u>NM through 60-0</u>
<u>32LH10</u>	<u>NM through 60-0</u>
<u>32LH11</u>	<u>NM through 60-0</u>
<u>32LH12</u>	<u>NM through 60-0</u>
<u>32LH13</u>	<u>NM through 60-0</u>
<u>32LH14</u>	<u>NM through 60-0</u>
<u>32LH15</u>	<u>NM through 60-0</u>
<u>36LH07</u>	<u>47-0 through 60-0</u>
<u>36LH08</u>	<u>47-0 through 60-0</u>
<u>36LH09</u>	<u>57-0 through 60-0</u>
<u>36LH10</u>	<u>NM through 60-0</u>
<u>36LH11</u>	<u>NM through 60-0</u>
<u>36LH12</u>	<u>NM through 60-0</u>
<u>36LH13</u>	<u>NM through 60-0</u>
<u>36LH14</u>	<u>NM through 60-0</u>
<u>36LH15</u>	<u>NM through 60-0</u>

NM = diagonal bolted bridging not mandatory for joists under forty (40) feet.

38.8.3.d. Employees shall not be allowed on steel joists where the span of the steel joist is equal to or greater than the span shown in Tables 36-23I and 36-23J except in accordance with §36-23-38.8.4.

38.8.3.e. When permanent bridging terminus points cannot be used during erection, additional temporary bridging terminus points are required to provide stability. (See Appendix C of 29 CFR OSHA §1926 Subpart R.)

38.8.4. Erection bridging.

38.8.4.a. Where the span of the steel joist is equal to or greater than the span shown in

Tables 36-23I and 36-23J, the following shall apply:

38.8.4.a.1. A row of bolted diagonal erection bridging shall be installed near the midspan of the steel joist;

38.8.4.a.2. Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored; and

38.8.4.a.3. No more than one (1) employee shall be allowed on these spans until all other bridging is installed and anchored.

38.8.4.b. Where the span of the steel joist is over sixty (60) feet through one hundred (100) feet, the following shall apply:

38.8.4.b.1. All rows of bridging shall be bolted diagonal bridging;

38.8.4.b.2. Two (2) rows of bolted diagonal erection bridging shall be installed near the third points of the steel joist;

38.8.4.b.3. Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored; and

38.8.4.b.4. No more than two (2) employees shall be allowed on these spans until all other bridging is installed and anchored.

38.8.4.c. Where the span of the steel joist is over one hundred (100) feet through one hundred forty-four (144) feet, the following shall apply:

38.8.4.c.1. All rows of bridging shall be bolted diagonal bridging;

38.8.4.c.2. Hoisting cables shall not be released until all bridging is installed and anchored; and

38.8.4.c.3. No more than two (2) employees shall be allowed on these spans until all bridging is installed and anchored.

38.8.4.d. For steel members spanning over one hundred forty-four (144) feet, the erection methods used shall be in accordance with §36-23-38.7. (beams and columns).

38.8.4.e. Where any steel joist specified in §§36-23-38.8.3.b., 36-23-38.8.4.a., 36-23-38.8.4.b., and 36-23-38.8.4.c. is a bottom chord bearing joist, a row of bolted diagonal bridging shall be provided near the support(s). This bridging shall be installed and anchored before the hoisting cable(s) is released.

38.8.4.f. When bolted diagonal erection bridging is required by this Section, the following shall apply:

38.8.4.f.1. The bridging shall be indicated on the erection drawing;

38.8.4.f.2. The erection drawing shall be the exclusive indicator of the proper placement

of this bridging;

38.8.4.f.3. Shop-installed bridging clips, or functional equivalents, shall be used where the bridging bolts to the steel joists;

38.8.4.f.4. When two (2) pieces of bridging are attached to the steel joist by a common bolt, the nut that secures the first piece of bridging shall not be removed from the bolt for the attachment of the second; and

38.8.4.f.5. Bridging attachments shall not protrude above the top chord of the steel joist.

#### 38.8.5. Landing and placing loads.

38.8.5.a. During the construction period, the employer placing a load on steel joists shall ensure that the load is distributed so as not to exceed the carrying capacity of any steel joist.

38.8.5.b. Except for §36-23-38.8.5.d., no construction loads are allowed on the steel joists until all bridging is installed and anchored and all joist-bearing ends are attached.

38.8.5.c. The weight of a bundle of joist bridging shall not exceed a total of one thousand (1,000) pounds. A bundle of joist bridging shall be placed on a minimum of three (3) steel joists that are secured at one end. The edge of the bridging bundle shall be positioned within one (1) foot of the secured end.

38.8.5.d. No bundle of decking may be placed on steel joists until all bridging has been installed and anchored and all joist bearing ends attached, unless all of the following conditions are met:

38.8.5.d.1. The employer has first determined from a qualified person and documented in a site-specific erection plan that the structure or portion of the structure is capable of supporting the load;

38.8.5.d.2. The bundle of decking is placed on a minimum of three (3) steel joists;

38.8.5.d.3. The joists supporting the bundle of decking are attached at both ends;

38.8.5.d.4. At least one (1) row of bridging is installed and anchored;

38.8.5.d.5. The total weight of the bundle of decking does not exceed four thousand (4,000) pounds; and

38.8.5.d.6. Placement of the bundle of decking shall be in accordance with §36-23-38.8.5.e.

38.8.5.e. The edge of the construction load shall be placed within one (1) foot of the bearing surface of the joist end.

#### 38.9. Systems-engineered metal buildings.

38.9.1. All of the requirements of this Section apply to the erection of systems-engineered metal buildings except §§36-23-38.6. (column anchorage) and 36-23-38.8. (open web steel joists).

38.9.2. Each structural column shall be anchored by a minimum of four (4) anchor rods (anchor bolts).

38.9.3. Rigid frames shall have fifty (50) percent of their bolts or the number of bolts specified by the manufacturer (whichever is greater) installed and tightened on both sides of the web adjacent to each flange before the hoisting equipment is released.

38.9.4. Construction loads shall not be placed on any structural steel framework unless such framework is safely bolted, welded or otherwise adequately secured.

38.9.5. In girt and eave strut-to-frame connections, when girts or eave struts share common connection holes, at least one (1) bolt with its wrench-tight nut shall remain connected to the first member unless a manufacturer-supplied, field-attached seat or similar connection device is present to secure the first member so that the girt or eave strut is always secured against displacement.

38.9.6. Both ends of all steel joists or cold-formed joists shall be fully bolted and/or welded to the support structure before:

38.9.6.a. Releasing the hoisting cables;

38.9.6.b. Allowing an employee on the joists; or

38.9.6.c. Allowing any construction loads on the joists.

38.9.7. Purlins and girts shall not be used as an anchorage point for a fall arrest system unless written approval is obtained from a qualified person.

38.9.8. Purlins may only be used as a walking/working surface when installing safety systems, after all permanent bridging has been installed and fall protection is provided.

38.9.9. Construction loads may be placed only within a zone that is within eight (8) feet of the center-line of the primary support member.

38.10. Falling object protection.

38.10.1. Securing loose items aloft. All materials, equipment, and tools, which are not in use while aloft, shall be secured against accidental displacement.

38.10.2. Protection from falling objects other than materials being hoisted. The controlling contractor shall bar other construction processes below steel erection unless overhead protection for the employees below is provided.

38.11. Fall protection.

38.11.1. General requirements.

38.11.1.a. Except as provided by §36-23-38.11.1.c., each employee engaged in a steel erection activity who is on a walking/working surface with an unprotected side or edge more than fifteen (15) feet above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.

38.11.1.b. Perimeter safety cables. On multi-story structures, perimeter safety cables shall be installed at the final interior and exterior perimeters of the floors as soon as the metal decking has been installed.

38.11.1.c. Connectors and employees working in controlled decking zones shall be protected from fall hazards as provided in §§36-23-38.11.2. and 36-23-38.11.3., respectively.

38.11.2. Connectors. Each connector shall:

38.11.2.a. Be protected in accordance with §36-23-38.11.1.a. from fall hazards of more than two (2) stories or thirty (30) feet above a lower level, whichever is less;

38.11.2.b. Have completed connector training in accordance with §36-23-38.2.; and

38.11.2.c. Be provided, at heights over fifteen (15) and up to thirty (30) feet above a lower level, with a personal fall arrest system, positioning device system or fall restraint system and wear the equipment necessary to be able to be tied off; or be provided with other means of protection from fall hazards in accordance with §36-23-38.11.1.a.

38.11.3. Controlled Decking Zone (CDZ). A controlled decking zone may be established in that area of the structure over fifteen (15) and up to thirty (30) feet above a lower level where metal decking is initially being installed and forms the leading edge of a work area. In each CDZ, the following shall apply:

38.11.3.a. Each employee working at the leading edge in a CDZ shall be protected from fall hazards of more than two (2) stories or thirty (30) feet, whichever is less.

38.11.3.b. Access to a CDZ shall be limited to only those employees engaged in leading edge work.

38.11.3.c. The boundaries of a CDZ shall be designated and clearly marked. The CDZ shall not be more than ninety (90) feet wide and ninety (90) feet deep from any leading edge. The CDZ shall be marked by the use of control lines or the equivalent.

38.11.3.d. Each employee working in a CDZ shall have completed CDZ training in accordance with §36-23-38.2.

38.11.3.e. Unsecured decking in a CDZ shall not exceed three thousand (3,000) square feet.

38.11.3.f. Safety deck attachments shall be performed in the CDZ from the leading edge back to the control line and shall have at least two (2) attachments for each metal decking panel.

38.11.3.g. Final deck attachments and installation of shear connectors shall not be performed in the CDZ.

38.11.4. Criteria for fall protection equipment.

38.11.4.a. Guardrail systems, safety net systems, personal fall arrest systems, positioning device systems and their components shall conform to the criteria in §36-23-41.4.

38.11.4.b. Fall arrest system components shall be used in fall restraint systems and shall

conform to the criteria in §36-23-41.4. Either body belts or body harnesses shall be used in fall restraint systems.

38.11.4.c. Perimeter safety cables shall meet the criteria for guardrail systems in §36-23-41.4.

38.11.5. Custody of fall protection. Fall protection provided by the steel erector shall remain in the area where steel erection activity has been completed, to be used by other trades, only if the controlling contractor or its authorized representative:

38.11.5.a. Has directed the steel erector to leave the fall protection in place; and

38.11.5.b. Has inspected and accepted control and responsibility of the fall protection prior to authorizing persons other than steel erectors to work in the area.

### 38.1. Flooring requirements:

~~———— (a) Permanent flooring -- skeleton steel construction in tiered buildings:~~

~~———— (1) The permanent floors shall be installed as the erection of structural members progresses, and there shall be not more than eight (8) stories between the erection floor and the uppermost permanent floor, except where the structural integrity is maintained as a result of the design.~~

~~———— (2) At no time shall there be more than four (4) floors or forty-eight (48) feet of unfinished bolting or welding above the foundation or uppermost permanently secured floor.~~

~~———— (b) Temporary flooring. Skeleton steel construction in tiered buildings:~~

~~———— (1)~~

~~———— (i) The derrick or erection floor shall be solidly planked or decked over its entire surface except for access openings. Planking or decking of equivalent strength shall be of proper thickness to carry the working load. Planking shall be not less than two (2) inches thick full size undressed, and shall be laid tight and secured to prevent movement.~~

~~———— (ii) On buildings or structures not adaptable to temporary floors, and where scaffolds are not used, safety nets shall be installed and maintained whenever the potential fall distance exceeds two (2) stories or thirty (30) feet. The nests shall be hung with sufficient clearance to prevent contacts with the surface of structures below.~~

~~———— (iii) Floor periphery -- safety railing. A safety railing of one-half (1/2) inch wire rope or equal shall be installed approximately forty-two (42) inches high, around the periphery of all temporary-planked or temporary metal-decked floors of tier buildings and other structural steel assembly.~~

~~———— (2)~~

~~———— (i) Where skeleton steel erection is being done, a tightly planked and substantial floor shall be maintained within two (2) stories or thirty (30) feet, whichever is less, below and directly under that portion of each tier of beams on which any work is being performed, except when gathering and stacking temporary floor planks on a lower floor, in preparation for transferring such planks for use on~~

~~an upper floor. Where such a floor is not practicable, paragraph (b)(1)(ii) of this section applies.~~

~~(ii) When gathering and stacking temporary floor planks, the planks shall be removed successively, working toward the last panel of the temporary floor so that the work is always done from the planked floor.~~

~~(iii) When gathering and stacking temporary floor planks from the last panel, the employees assigned to such work shall be protected by safety belts with safety lines attached to a catenary line or other substantial anchorage.~~

~~(c) Flooring. Other construction:~~

~~(1) In the erection of a building having double wood floor construction, the rough flooring shall be completed as the building progresses, including the tier below the one on which floor hoists are being installed.~~

~~(2) For single wood floor or other flooring systems, the floor immediately below the story where the floor hoists are being installed shall be kept planked or decked over.~~

~~38.2. Structural steel assembly:~~

~~(a) During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with not less than two (2) bolts, or the equivalent at each connection and drawn of wrench tight.~~

~~(b) Open web steel hoists shall not be placed on any structural steel framework unless such framework is safely bolted or welded.~~

~~(c)~~

~~(1) In steel framing where bar hoists are utilized and columns are not framed in at least two (2) directions with structural steel members, a bar hoist shall be field bolted at columns to provide lateral stability during construction.~~

~~(2) Where longspan hoists or trusses forty (40) feet or longer are used, a center row of bolted bridging shall be installed to provide lateral stability during construction prior to slacking of hoisting line.~~

~~(3) No load shall be placed on open web steel hoists until these security requirements are met.~~

~~38.3. Bolting, riveting, fitting-up, and plumbing-up:~~

~~(a) General requirements:~~

~~(1) Containers shall be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.~~

~~(2) Pneumatic hand tools shall be disconnected from the power source and pressure in hose lines shall be released before any adjustments or repairs are made.~~

~~———— (3) Air line hose sections shall be tied together except when quick disconnect couplers are used to join sections:~~

~~———— (4) Eye protection shall be provided in accordance with these regulations:~~

~~———— (b) Bolting:~~

~~———— (1) When bolts or drift pins are being knocked out, means shall be provided to keep them from falling:~~

~~———— (2) Impact wrenches shall be provided with a locking device for retaining the socket:~~

~~———— (c) Riveting:~~

~~———— (1) Riveting shall not be done in the vicinity of combustible material unless precautions are taken to prevent fire:~~

~~———— (2) When rivet heads are knocked off or backed out, means shall be provided to keep them from falling:~~

~~———— (3) A safety wire shall be properly installed on the snap and on the handle of the pneumatic riveting hammer and shall be used at all times. The wire size shall be not less than No. 9 (D & S gauge), leaving the handle and annealed No. 14 on the snap, or equivalent:~~

~~———— (d) Plumbing-up:~~

~~———— (1) Connections of the equipment used in plumbing-up shall be properly secured:~~

~~———— (2) The turnbuckles shall be secured to prevent unwinding while under stress:~~

~~———— (3) Plumbing-up guys related equipment shall be placed so that employees can get at the connection points:~~

~~———— (4) Plumbing-up guys shall be removed only under the supervision of a competent person:~~

~~———— (e) Wood planking shall be of proper thickness to carry the working load, but shall be not less than two (2) inches thick full size undressed, exterior grade plywood, at least three-quarter (3/4) inch thick, or equivalent material:~~

~~———— (f) Metal decking of sufficient strength shall be laid tight and secured to prevent movement:~~

~~———— (g) Planks shall overlap the bearing on each end by a minimum of twelve (12) inches:~~

~~———— (h) Wire mesh, exterior plywood, or equivalent, shall be used around columns where planks do not fit tightly:~~

~~———— (i) Provisions shall be made to secure temporary flooring against displacement:~~

~~———— (j) All unused openings in floors, temporary or permanent, shall be completely planked over or guarded:~~

~~(k) Employees shall be provided with safety belts when they are working on float scaffolds.~~

### **§36-23-39. Demolition.**

#### **39.1. Preparatory operations.**

39.1.1. ~~(a)~~ Prior to permitting employees to start demolition operations, an engineering survey shall be made ~~by a competent person~~ of the structure by a structural engineer to determine the condition of the framing, floors, and walls, and the possibility of unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked. The employer shall have in writing evidence that such a survey has been performed.

39.1.2. It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, asbestos, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, the West Virginia Department of Environmental Protection shall be notified and any hazards eliminated before demolition is started.

39.1.3. ~~(b)~~ When employees are required to work within a structure to be demolished which has been damaged by fire, flood, explosion, or other cause, the walls or floor shall be shored or braced.

39.1.4. ~~(c)~~ All electric, gas, water, steam, sewer and other service lines shall be shut off, capped, or otherwise controlled outside the building line before demolition work is started. In each case, any utility company which is involved shall be notified in advance.

39.1.5. ~~(d)~~ ~~if~~ it is necessary to maintain any power, water or other utilities during the demolition, such lines shall be temporarily relocated, as necessary, and protected.

~~(e) It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.~~

39.1.6. ~~(f)~~ Where a hazard exists from fragmentation of glass, such hazards shall be removed.

39.1.7. ~~(g)~~ Where a hazard exists to employees falling through wall openings, the opening shall be protected to a height of approximately forty-two (42) inches.

39.1.8. ~~(h)~~ When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades not less than forty-two (42) inches high and not less than six (6) feet back from the projected edge of the opening above. Signs warning of the hazard of falling materials shall be posted at each level and all areas shall be guarded against entry. Removal shall not be permitted in this lower area until debris handling ceases above.

39.1.9. ~~(i)~~ All floor openings, not used as material drops, shall be covered over with material substantial enough to support the weight of any load which may be imposed. Such material shall be properly secured to prevent its accidental movement.

39.1.10. ~~(j)~~ Except for the cutting of holes in floors for chutes, holes through which to drop materials, preparation of storage space, and similar necessary preparatory work, the demolition of

exterior walls and floor construction shall begin at the top of the structure and proceed downward. Prior to removal of walls and floors, an inspection shall be conducted to assure no hazards exist due to walls and floors being removed. Each story of exterior wall and floor construction shall be removed and dropped into the storage space before commencing the removal of exterior walls and floors in the story next below.

39.1.11. ~~(k)~~ Employee entrances to multi-story structures being demolished shall be completely protected by sidewalk sheds or canopies, or both, providing protection from the face of the building for a minimum of eight (8) feet. All such canopies shall be at least two (2) feet wider than the building entrances or openings (one (1) foot wider on each side thereof), and shall be capable of sustaining a load of one hundred fifty (150) pounds per square foot.

## 39.2. Stairs, passageways, and ladders.

39.2.1. ~~(a)~~ Only those stairways, passageways, and ladders, designated as means of access to the structure of a building, shall be used. Other access ways shall be entirely closed at all times.

39.2.2. ~~(b)~~ All stairs, passageways, ladders and incidental equipment thereto, which are covered by this Section, shall be periodically inspected during each shift and maintained in a clean safe condition.

39.2.3. ~~(c)~~ In a multi-story building, when a stairwell is being used, it shall be properly illuminated by either natural or artificial means, and completely and substantially covered over at a point not less than two (2) floors below the floor on which work is being performed, and access to the floor where the work is in progress shall be through a properly lighted, protected, and separate passageway.

## 39.3. ~~39.2.~~ Chutes.

39.3.1. ~~(a)~~ No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effectively protected.

39.3.2. ~~(b)~~ All material chutes, or sections thereof, at an angle of more than forty-five (45) degrees from the horizontal, shall be entirely enclosed, except for openings equipped with closures at or about floor level for the insertion of materials. The openings shall not exceed forty-eight (48) inches in height measured along the wall of the chute. At all stories below the top floor, such openings shall be kept closed when not in use.

39.3.3. ~~(c)~~ A substantial gate shall be installed in each chute at or near the discharge end. A competent employee shall be assigned to control the operation of the gate, and the backing and loading of trucks.

39.3.4. ~~(d)~~ When operations are not in progress, the area surrounding the discharge end of the chute shall be securely closed off.

39.3.5. ~~(e)~~ Any chute opening into which ~~workmen~~ workers dump debris shall be protected by a substantial guardrail approximately forty-two (42) inches above the floor or other surface on which the ~~men~~ workers stand to dump the material. Any space between the chute and the edge of openings in the floors through which it passes shall be solidly covered over.

39.3.6. ~~(f)~~ Where the material is dumped from mechanical equipment or wheelbarrows, a securely attached toeboard or bumper, not less than four (4) inches thick and six (6) inches high, shall be

provided at each chute opening.

39.3.7. ~~(g)~~ Chutes shall be designed and constructed of such strength as to eliminate failure due to impact of materials or debris loaded therein.

#### 39.4. Removal of materials through floor openings.

39.4.1. Any openings cut in a floor for the disposal of materials shall be no larger in size than twenty-five (25) percent of the aggregate of the total floor area, unless the lateral supports of the removed flooring remain in place. Floors weakened or otherwise made unsafe by demolition operations shall be shored to carry safely the intended imposed load from demolition operations.

#### 39.5. Removal of walls, masonry sections, and chimneys.

39.5.1. ~~(a)~~ Masonry walls, or other sections of masonry, shall not be permitted to fall upon the floors of the building in such masses as to exceed the safe carrying capacities of the floors.

39.5.2. ~~(b)~~ No wall section which is more than one (1) story in height shall be permitted to stand alone without lateral bracing, unless such wall was originally designed and constructed to stand without such lateral support and is in a condition safe enough to be self-supporting. All walls shall be left in a stable condition at the end of each shift.

39.5.3. ~~(c)~~ Employees shall not be permitted to work on the top of a wall when weather conditions constitute a hazard.

39.5.4. ~~(d)~~ Structural or load-supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. This provision shall not prohibit the cutting of floor beams for the disposal of materials or for the installation of equipment, provided that the requirements of Sections 39.4. and 39.6. ~~of these regulations are complied with~~ are followed.

39.5.5. ~~(e)~~ Floor openings within ten (10) feet of any wall being demolished shall be planked solid except when employees are kept out of the area below.

39.5.6. ~~(f)~~ In buildings of "skeleton-steel" construction, the steel framing may be left in place during the demolition of masonry. Where this is done, all steel beams, girders, and similar structural supports shall be cleared of all loose material as the masonry demolition progresses downward.

39.5.7. ~~(g)~~ Walkways or ladders shall be provided to enable employees to safely reach or leave any scaffold or wall.

39.5.8. ~~(h)~~ Walls which serve as retaining walls to support earth or adjoining structures shall not be demolished until such earth has been properly braced or adjoining structures have been properly underpinned.

39.5.9. ~~(i)~~ Walls which are to serve as retaining walls against which debris will be piled shall not be so used unless capable of safely supporting the imposed load.

#### 39.6. Manual removal of floors.

39.6.1. ~~(a)~~ Openings cut in a floor shall extend the full span of the arch between supports.

39.6.2. ~~(b)~~ Before demolishing any floor arch, debris and other material shall be removed from such arch and other adjacent floor area. Planks not less than two (2) inches ~~x~~ by ten (10) inches in cross section, full size undressed, shall be provided for and shall be used by employees to stand on while breaking down floor arches between beams. Such planks shall be so located as to provide a safe support for the ~~workmen~~ workers should the arch between the beams collapse. The open space between planks shall not exceed sixteen (16) inches.

39.6.3. ~~(c)~~ Safe walkways, not less than eighteen (18) inches wide, formed of planks not less than two (2) inches thick if wood, or of equivalent strength if metal, shall be provided and used by ~~workmen~~ workers when necessary to enable them to reach any point without walking upon exposed beams.

39.6.4. ~~(d)~~ Stringers of ample strength shall be installed to support the flooring planks, and the ends of such stringers shall be supported by floor beams or girders and not be floor arches alone.

39.6.5. ~~(e)~~ Planks shall be laid together over solid bearings with the ends overlapping at least one (1) foot.

39.6.6. ~~(f)~~ When floor arches are being removed, employees shall not be allowed in the area directly underneath, and such an area shall be barricaded to prevent access to it.

39.6.7. ~~(g)~~ Demolition of floor arches shall not be started until they, and the surrounding floor area for a distance of twenty (20) feet, have been cleared of debris and any other necessary materials.

### 39.7. Removal of walls, floors, and material with equipment.

39.7.1. ~~(a)~~ Mechanical equipment shall not be used on floors or working surfaces unless such floors or surfaces are of sufficient strength to support the imposed load.

39.7.2. Floor openings shall have curbs or stop-logs to prevent equipment from running over the edge.

### 39.8. Storage.

39.8.1. The storage of waste material and debris on any floor shall not exceed the allowable floor loads.

39.8.2. In buildings having wooden floor construction, the flooring boards may be removed from not more than one (1) floor above grade to provide storage space for debris, provided falling material is not permitted to endanger the stability of the structure.

39.8.3. When wood floor beams serve to brace interior walls or free-standing exterior walls, such beams shall be left in place until other equivalent support can be installed to replace them.

39.8.4. Floor arches, to an elevation of not more than twenty-five (25) feet above grade, may be removed to provide storage for debris: *Provided*, that such removal does not endanger the stability of the structure.

39.8.5. Storage space into which material is dumped shall be blocked off, except for openings necessary for the removal of material. Such openings shall be kept closed at all times when material is not being removed.

39.9. Removal of steel construction.

39.9.1. When floor arches have been removed, planking in accordance with §36-23-39.6.2. shall be provided for the workers engaged in razing the steel framing.

39.9.2. Cranes, derricks, and other hoisting equipment. Employers must meet the requirements specified in §36-23-34 and §36-23-42.

39.9.3. Steel construction shall be dismantled column length by column length and tier by tier (columns may be in two-story lengths).

39.9.4. Any structural member being dismembered shall not be overstressed.

39.10. Mechanical demolition.

39.10.1. No workers shall be permitted in any area which can be adversely affected by demolition operations when balling or clamming is being performed. Only those workers necessary for the performance of the operations shall be permitted in this area at any other time.

39.10.2. The weight of the demolition ball shall not exceed fifty (50) percent of the crane's rated load, based on the length of the boom and the maximum angle of operation at which the demolition ball will be used, or it shall not exceed twenty-five (25) percent of the nominal breaking strength of the line by which it is suspended, whichever results in a lesser value.

39.10.3. The crane boom and loadline shall be as short as possible.

39.10.4. The ball shall be attached to the loadline with a swivel-type connection to prevent twisting of the loadline, and shall be attached by positive means in such manner that the weight cannot become accidentally disconnected.

39.10.5. When pulling over walls or portions thereof, all steel members affected shall have been previously cut free.

39.10.6. All roof cornices or other such ornamental stonework shall be removed prior to pulling walls over.

39.10.7. During demolition, continuing inspections by a competent person shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, or walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

## 39.11. Selective demolition by explosives.

39.11.1. Selective demolition by explosives shall be conducted in accordance with Section 40. of these regulations.

**§36-23-40. Blasting and the Use of Explosives.**40.1. Definitions applicable to this Section.

40.1.1. "American Table of Distances" (also known as Quantity Distance Tables) shall mean

American Table of Distances for Storage of Explosives as revised and approved by the Institute of the Makers of Explosives, June 5, 1964.

40.1.2. "Approved storage facility" shall mean a facility for the storage of explosive material conforming to the requirements of this Section and covered by a license or permit.

40.1.3. "Blast area" shall mean the area in which explosives loading and blasting operations are being conducted.

40.1.4. "Blaster" shall mean the person or persons authorized to use explosives for blasting purposes and meeting the qualifications in this rule.

40.1.5. "Blasting agent" shall mean a blasting agent that is any material or mixture consisting of a fuel and oxidizer used for blasting, but not classified an explosive and in which none of the ingredients is classified as an explosive provided the furnished (mixed) product cannot be detonated with a No. 8 test blasting cap when confined. A common blasting agent presently in use is a mixture of ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>) and carbonaceous combustibles, such as fuel oil or coal, and may either be procured, premixed and packaged from explosives companies or mixed in the field.

40.1.6. "Blasting caps" shall mean a metallic tube closed at one end, containing a charge of one (1) or more detonating compounds, and designed for and capable of detonation from the sparks or flame from a safety fuse inserted and crimped into the open end.

40.1.7. "Block holing" shall mean the breaking of boulders by firing a charge of explosives that has been loaded in a drill hole.

40.1.8. "Conveyance" shall mean any unit for transporting explosives or blasting agents, including but not limited to trucks, trailers, rail cars, barges, and vessels.

40.1.9. "Detonating cord" shall mean a flexible cord containing a center core of high explosives which when detonated will have sufficient strength to detonate other cap-sensitive explosives with which it is in contact.

40.1.10. "Detonator" shall mean blasting caps, electric blasting caps, delay electric blasting caps, and nonelectric delay blasting caps.

40.1.11. "Electric blasting cap" shall mean a blasting cap designed for and capable of detonation by means of an electric current.

40.1.12. "Electric blasting circuitry" shall mean:

40.1.12.a. Bus wire. An expendable wire, used in parallel or series, in parallel circuits, to which are connected the leg wires of electric blasting caps.

40.1.12.b. Connecting wire. An insulated expendable wire used between electric blasting caps and the leading wires or between the bus wire and the leading wires.

40.1.12.c. Leading wire. An insulated wire used between the electric power source and the electric blasting cap circuit.

40.1.12.d. Permanent blasting wire. A permanently mounted insulated wire used between

the electric power source and the electric blasting cap circuit.

40.1.13. "Electric delay blasting caps" shall mean caps designed to detonate at a predetermined period of time after energy is applied to the ignition system.

40.1.14. "Explosives" shall mean:

40.1.14.a. Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion; that is, with substantially instantaneous release of gas and heat.

40.1.14.b. All material which is classified as Class A, Class B, and Class C Explosives by the U.S. Department of Transportation.

40.1.14.c. Classification of explosives by the U.S. Department of Transportation is as follows:

40.1.14.c.1. Class A Explosives. Possessing detonating hazard, such as dynamite, nitroglycerin, picric acid, lead azide, fulminate of mercury, black powder, blasting caps, and detonating primers.

40.1.14.c.2. Class B Explosives. Possessing flammable hazard, such as propellant explosives, including some smokeless propellants.

40.1.14.c.3. Class C Explosives. Include certain types of manufactured articles which contain Class A or Class B explosives, or both, as components, but in restricted quantities.

40.1.15. "Fuse lighters" shall mean special devices for the purpose of igniting safety fuses.

40.1.16. "Magazine" shall mean any building or structure, other than an explosives manufacturing building, used for the storage of explosives.

40.1.17. "Misfire" shall mean an explosive charge which failed to detonate.

40.1.18. "Mud-capping" (sometimes known as bulldozing, adobe blasting, or dobbing) shall mean the blasting of boulders by placing a quantity of explosives in a drill hole.

40.1.19. "Nonelectric delay blasting cap" shall mean a blasting cap with an integral delay element in conjunction with and capable of being detonated by a detonation impulse or signal from miniaturized detonating cord.

40.1.20. "Primary blasting" shall mean the blasting operation by which the original rock formation is dislodged from its natural location.

40.1.21. "Primer" shall mean a cartridge or container of explosives into which a detonator or detonating cord is inserted or attached.

40.1.22. "Safety fuse" shall mean a flexible cord containing an internal burning medium by which fire is conveyed at a continuous and uniform rate for the purpose of firing blasting caps.

40.1.23. "Secondary blasting" shall mean the reduction of oversize material by the use of explosives to the dimension required for handling, including mud-capping and blockholing.

40.1.24. "Stemming" shall mean a suitable inert incombustible material or device used to confine or separate explosives in a drill hole, or to cover explosives in mud-capping.

40.1.25. "Springing" shall mean the creation of a pocket in the bottom of a drill hole by the use of a moderate quantity of explosives in order that larger quantities or explosives may be inserted therein.

40.1.26. "Water gels, or slurry explosives" shall mean a wide variety of materials used for blasting. They all contain substantial proportions of water and high proportions of ammonium nitrate, some of which is in solution in the water.

40.1.26.a. Two (2) broad classes of water gels are:

40.1.26.a.1. Those which are sensitized by a material classed as an explosive, such as TNT or smokeless powder, and

40.1.26.a.2. Those which contain no ingredient classified as an explosive; these are sensitized with metals such as aluminum or with other fuels.

40.1.26.b. Water gels may be premixed at an explosives plant or mixed at the site immediately before delivery into the bore hole.

40.1.27. "Semiconductive hose" shall mean a hose with an electrical resistance high enough to limit flow of stray electric currents to safe levels, yet not so high as to prevent drainage of static electric charges to ground; hose of not more than two (2) megohms resistance over its entire length and of not less than five thousand (5,000) ohms per foot meets the requirement.

## 40.2. General provisions.

40.2.1. The transportation, storage, handling and use of explosive materials and blasting accessories shall be in accordance with the current Institute of Makers of Explosives Warnings and Instructions. A copy of the current Institute of Makers of Explosives Warnings and Instructions shall be made available to employees upon request. All persons involved in the blasting procedure shall be properly trained and familiar with these Warnings and Instructions and a record kept of this training for one (1) year and made available upon request to a representative of the Director and interested persons.

40.2.2. All persons performing blasting operations on construction projects shall be certified. The employer shall permit only authorized and qualified persons to handle and use explosives.

40.2.3. Smoking, firearms, matches, open flame lamps, and other fires, flame or heat producing devices and sparks shall be prohibited in or near explosive magazines or while explosives are being handled, transported or used.

40.2.4. No person shall be allowed to handle or use explosives while under the influence of intoxicating liquors, narcotics, or other dangerous drugs.

40.2.5. All explosives shall be accounted for at all times. Explosives not being used shall be kept in a locked magazine, unavailable to persons not authorized to handle them. The employer shall maintain an inventory and use records of all explosives which shall be made available for inspection by interested persons. Appropriate authorities shall be notified of any loss, theft, or unauthorized entry

into a magazine.

40.2.6. No explosives or blasting agents shall be abandoned.

40.2.7. No fire shall be fought where the fire is in imminent danger of contact with explosives. All employees shall be removed to a safe area and the fire area guarded against intruders.

40.2.8. Original containers, or Class 2 magazine(s), shall be used for taking detonators and other explosives from storage magazines to the blasting area.

40.2.9. When blasting is done in congested areas or in proximity to a structure, railway, or highway, or any other installation that may be damaged, the blaster shall take special precautions in the loading, delaying, initiation, and confinement of each blast with mats or other methods so as to control the throw of fragments, and thus prevent bodily injury to all persons in the area.

40.2.10. Employees authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution including, but not limited to, visual and audible warning signals, flags, or barricades, to ensure safety.

40.2.11. Insofar as possible, blasting operations above ground shall be conducted between sunup and sundown.

40.2.12. Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent power lines, dust storms, or other sources of extraneous electricity. These precautions shall include:

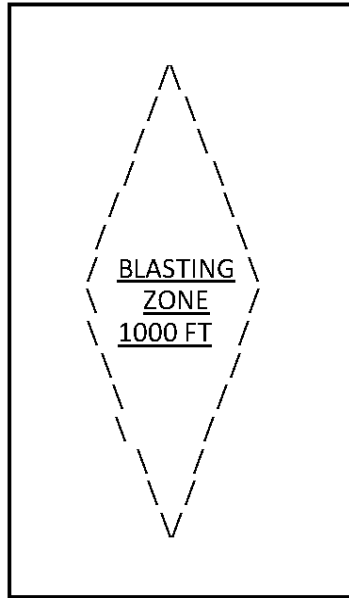
40.2.12.a. Detonators shall be short-circuited in holes which have been primed and shunted until wired into the blasting circuit.

40.2.12.b. The suspension of all blasting operations and removal of persons from the blasting area during the approach and progress of an electric storm;

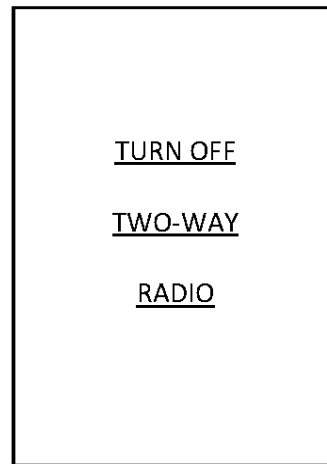
40.2.12.c. Signage and alternative provisions.

40.2.12.c.1. The prominent display of adequate signs, warning against the use of mobile radio transmitters, on all roads within one thousand (1,000) feet of blasting operations. Whenever adherence to the one thousand (1,000) foot distance would create an operational handicap, a competent person shall be consulted to evaluate the particular situation, and alternative provisions may be made which are adequately designed to prevent any premature firing of electric blasting caps. A description of any such alternatives shall be reduced to writing and shall be certified as meeting the purposes of this Paragraph by the competent person consulted. The description shall be maintained at the construction site during the duration of the work, and shall be available for inspection by interested persons.

40.2.12.c.2. Specimens of signs which would meet the requirements of Paragraph 40.2.11.c.1. are the following:



About 42" x 36"



About 48" x 48"

40.2.12.d. Ensuring that mobile radio transmitters which are less than one hundred (100) feet away from electric blasting caps, in other than original containers, shall be deenergized and effectively locked.

40.2.12.e. Compliance with the recommendations of the Institute of the Makers of Explosives with regard to blasting in the vicinity of radio transmitters as stipulated in Radio Frequency Energy-A Potential Hazard in the Use of Electric Blasting Caps, IME Publication No. 20, March 1971.

40.2.13. Empty boxes and paper and fiber packing materials, which have previously contained high explosives, shall not be used again for any purpose, but shall be destroyed by burning at an approved location.

40.2.14. Explosives, blasting agents, and blasting supplies that are obviously deteriorated or damaged shall not be used.

40.2.15. Delivery and issue of explosives shall only be made by and to authorized persons and into authorized magazines or approved temporary storage or handling areas.

40.2.16. Blasting operations in the proximity of overhead power lines, communication lines, utility services, or other services and structures shall not be carried on until the operators and/or owners have been notified and measures for safe control have been taken.

40.2.17. The use of black powder shall be prohibited.

40.2.18. All loading and firing shall be directed and supervised by a certified person thoroughly experienced in this field.

40.2.19. All blasts shall be fired electrically with an electric blasting machine or properly designed electric power source, except as provided in Subsections 40.8.1. and 40.8.16. of Section 40.8.

40.3. Explosives and blasting agents.

40.3.1. Buildings used for the mixing of blasting agents and water gels shall conform to the requirements of this Section.

40.3.2. Buildings shall be of noncombustible construction or sheet metal on wood studs.

40.3.3. Floors in a mixing plant shall be of concrete or of other nonabsorbent materials.

40.3.4. All fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture, the oil will drain away from the mixing plant building.

40.3.5. The building shall be well ventilated.

40.3.6. Heating units which do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside the mixing building.

40.3.7. All internal-combustion engines used for electric power generation shall be located outside the mixing plant building, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

40.4. Blaster qualifications.

40.4.1. A blaster shall be able to understand and give written and oral orders.

40.4.2. A blaster shall be in good physical condition and not be addicted to narcotics, intoxicants, or similar types of drugs.

40.4.3. A blaster shall be qualified, by training, knowledge, or experience, in the field of transporting, storing, handling, and use of explosives, and have a working knowledge of state and local laws and regulations which pertain to explosives.

40.4.4. Blasters shall be required to furnish satisfactory evidence of competency in handling explosives and performing in a safe manner the type of blasting that will be required.

40.4.5. The blaster shall be knowledgeable and competent in the use of each type of blasting method used.

40.5. Surface transportation of explosives.

40.5.1. Transportation of explosives shall meet the provisions of Department of Transportation's regulations contained in 46 CFR Parts 146-149, Water Carriers; 49 CFR Parts 171-179, Highways and Railways; 49 CFR Part 195, Pipelines; and 49 CFR Parts 390-397, Motor Carriers. Motor vehicles or conveyances transporting explosives shall only be driven by, and be in the charge of, a licensed driver who is physically fit. They shall be familiar with the local, state, and federal regulations governing the transportation of explosives.

40.5.2. No person shall smoke, or carry matches or any other flame-producing device, nor shall firearms or loaded cartridges be carried while in or near a motor vehicle or conveyance transporting

explosives.

40.5.3. Explosives, blasting agents, and blasting supplies shall not be transported with other materials or cargoes. Blasting caps (including electric) shall not be transported in the same vehicle with other explosives.

40.5.4. Vehicles used for transporting explosives shall be strong enough to carry the load without difficulty, and shall be in good mechanical condition.

40.5.5. When explosives are transported by a vehicle with an open body, a Class 2 magazine or original manufacturer's container shall be securely mounted on the bed to contain the cargo.

40.5.6. All vehicles used for the transportation of explosives shall have tight floors and any exposed spark-producing metal on the inside of the body shall be covered with wood, or other nonsparking material, to prevent contact with containers of explosives.

40.5.7. Every motor vehicle or conveyance used for transporting explosives shall be marked or placarded on both sides, the front, and the rear with the word "Explosives" in red letters, not less than four (4) inches in height, on white background. In addition to such marking or placarding, the motor vehicle or conveyance may display, in such a manner that it will be readily visible from all directions, a red flag eighteen (18) inches by thirty (30) inches, with the word "Explosives" painted, stamped, or sewed thereon, in white letters, at least six (6) inches in height.

40.5.8. Each vehicle used for transportation of explosives shall be equipped with a fully charged fire extinguisher, in good condition. An approved extinguisher of not less than ten (10) ABC rating will meet the minimum requirement. The driver shall be trained in the use of the extinguisher on his/her vehicle.

40.5.9. Motor vehicles or conveyances carrying explosives, blasting agents, or blasting supplies, shall not be taken inside a garage or shop for repairs or servicing.

40.5.10. No motor vehicle transporting explosives shall be left unattended.

40.6. Storage of explosives and blasting agents.

40.6.1. Explosives and related materials shall be stored in approved facilities required under the applicable provisions of the Bureau of Alcohol, Tobacco and Firearms' regulations contained in 27 CFR Part 55.

40.6.2. Blasting caps, electric blasting caps, detonating primers, and primed cartridges shall not be stored in the same magazine with other explosives or blasting agents.

40.6.3. Smoking and open flames shall not be permitted within fifty (50) feet of explosives and detonator storage magazines.

40.7. Loading of explosives or blasting agents.

40.7.1. Procedures that permit safe and efficient loading shall be established before loading is started.

40.7.2. All drill holes shall be sufficiently large to admit freely the insertion of the cartridges of

explosives.

40.7.3. Tamping shall be done only with wood rods or plastic tamping poles without exposed metal parts, but nonsparking metal connectors may be used for jointed poles. Violent tamping shall be avoided. The primer shall never be tamped.

40.7.4. No holes shall be loaded except those to be fired in the next round of blasting. After loading, all remaining explosives and detonators shall be immediately returned to an authorized magazine.

40.7.5. Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges, and if any are found, they shall be refired before work proceeds.

40.7.6. No person shall be allowed to deepen drill holes which have contained explosives or blasting agents.

40.7.7. No explosives or blasting agents shall be left unattended at the blast site.

40.7.8. Machines and all tools not used for loading explosives into bore holes shall be removed from the immediate location of holes before explosives are delivered. Equipment shall not be operated within fifty (50) feet of loaded holes.

40.7.9. No activity of any nature other than that which is required for loading holes with explosives shall be permitted in a blast area.

40.7.10. Power lines and portable electric cables for equipment being used shall be kept a safe distance from explosives or blasting agents being loaded into drill holes. Cables in the proximity of the blast area shall be deenergized and locked out by the blaster.

40.7.11. Holes shall be checked prior to loading to determine depth and conditions. Where a hole has been loaded with explosives but the explosives have failed to detonate, there shall be no drilling within fifty (50) feet of the hole.

40.7.12. When loading a long line of holes with more than one (1) loading crew, the crews shall be separated by practical distance consistent with efficient operation and supervision of crews.

40.7.13. No explosive shall be loaded or used underground in the presence of combustible gases or combustible dusts.

40.7.14. No explosives other than those in fume Class 1, as set forth by the Institute of Makers of Explosives, shall be used; however, explosives complying with the requirements of fume Class 2 and fume Class 3 may be used if adequate ventilation has been provided.

40.7.15. All blast holes in openwork shall be stemmed to the collar or to a point which will confine the charge.

40.7.16. Warning signs, indicating a blast area, shall be maintained at all approaches to the blast area. The warning sign lettering shall not be less than four (4) inches in height on a contrasting background.

40.7.17. A bore hole shall never be sprung when it is adjacent to or near a hole that is loaded.

Flashlight batteries shall not be used for springing holes.

40.7.18. Drill holes which have been sprung or chambered, and which are not water filled, shall be allowed to cool before explosives are loaded.

40.7.19. No loaded holes shall be left unattended or unprotected.

40.7.20. The blaster shall keep an accurate, up-to-date record of explosives, blasting agents, and blasting supplies used in a blast and shall keep an accurate running inventory of all explosives and blasting agents stored on the operation.

40.7.21. When loading blasting agents pneumatically over electric blasting caps, semiconductive delivery hose shall be used and the equipment shall be bonded and grounded.

40.8. Initiation of explosive charges. Electric blasting.

40.8.1. Electric blasting caps shall not be used where sources of extraneous electricity make the use of electric blasting caps dangerous. Blasting cap leg wires shall be kept short-circuited (shunted) until they are connected into the circuit for firing.

40.8.2. Before adopting any system of electrical firing, the blaster shall conduct a thorough survey for extraneous currents, and all dangerous currents shall be eliminated before any holes are loaded.

40.8.3. In any single blast using electric blasting caps, all caps shall be of the same style or function, and of the same manufacture.

40.8.4. Electric blasting shall be carried out by using blasting circuits or power circuits in accordance with the electric blasting cap manufacturer's recommendations, or an approved contractor or his/her designated representative.

40.8.5. When firing a circuit of electric blasting caps, care must be exercised to ensure that an adequate quantity of delivered current is available, in accordance with the manufacturer's recommendations.

40.8.6. Connecting wires and lead wires shall be insulated single solid wires of sufficient current-carrying capacity.

40.8.7. Bus wires shall be solid single wires of sufficient current-carrying capacity.

40.8.8. When firing electrically, the insulation on all firing lines shall be adequate and in good condition.

40.8.9. A power circuit used for firing electric blasting caps shall not be grounded.

40.8.10. When firing from a power circuit, the firing switch shall be locked in the open or "Off" position at all times, except when firing. It shall be so designed that the firing lines to the cap circuit are automatically short-circuited when the switch is in the "Off" position. Keys to this switch shall be entrusted only to the blaster.

40.8.11. Blasting machines shall be in good condition and the efficiency of the machine shall be

tested periodically to make certain that it can deliver power at its rated capacity.

40.8.12. When firing with blasting machines, the connections shall be made as recommended by the manufacturer of the electric blasting caps used.

40.8.13. The number of electric blasting caps connected to a blasting machine shall not be in excess of its rated capacity. Furthermore, in primary blasting, a series circuit shall contain no more caps than the limits recommended by the manufacturer of the electric blasting caps in use.

40.8.14. The blaster shall be in charge of the blasting machines, and no other person shall connect the leading wires to the machine.

40.8.15. Blasters, when testing circuits to charged holes, shall use only blasting galvanometers equipped with a silver chloride cell specifically designed for this purpose.

40.8.16. Whenever the possibility exists that a leading line or blasting wire might be thrown over a live power line by the force of an explosion, care shall be taken to see that the total length of wires are kept too short to hit the lines, or that the wires are securely anchored to the ground. If neither of these requirements can be satisfied, a nonelectric system shall be used.

40.8.17. In electrical firing, only the person making leading wire connections shall fire the shot. All connections shall be made from the bore hole back to the source of firing current, and the leading wires shall remain shorted and not be connected to the blasting machine or other source of current until the charge is to be fired.

40.8.18. After firing an electric blast from a blasting machine, the leading wires shall be immediately disconnected from the machine and short-circuited.

#### 40.9. Use of safety fuse.

40.9.1. Safety fuse shall only be used where sources of extraneous electricity make the use of electric blasting caps dangerous. The use of a fuse that has been hammered or injured in any way shall be forbidden.

40.9.2. The hanging of a fuse on nails or other projections which will cause a sharp bend to be formed in the fuse is prohibited.

40.9.3. Before capping safety fuse, a short length shall be cut from the end of the supply reel so as to assure a fresh cut end in each blasting cap.

40.9.4. Only a cap crimper of approved design shall be used for attaching blasting caps to safety fuse. Crimpers shall be kept in good repair and accessible for use.

40.9.5. No unused cap or short capped fuse shall be placed in any hole to be blasted; such unused detonators shall be removed from the working place and destroyed.

40.9.6. No fuse shall be capped, or primers made up, in any magazine or near any possible source of ignition.

40.9.7. No one shall be permitted to carry detonators or primers of any kind on their person.

40.9.8. The minimum length of safety fuse to be used in blasting shall be as required by state law, but shall not be less than thirty (30) inches.

40.9.9. At least two (2) people shall be present when multiple cap and fuse blasting is done by hand lighting methods.

40.9.10. Not more than twelve (12) fuses shall be lighted by each blaster when hand lighting devices are used. However, when two (2) or more safety fuses in a group are lighted as one (1) by means of igniter cord, or other similar fuse-lighting devices, they may be considered as one (1) fuse.

40.9.11. The so-called "drop fuse" method of dropping or pushing a primer or any explosive with a lighted fuse attached is forbidden.

40.9.12. Cap and fuse shall not be used for firing mudcap charges unless charges are separated sufficiently to prevent one (1) charge from dislodging other shots in the blast.

40.9.13. When blasting with safety fuses, consideration shall be given to the length and burning rate of the fuse. Sufficient time, with a margin of safety, shall always be provided for the blaster to reach a place of safety.

#### 40.10. Use of detonating cord.

40.10.1. Care shall be taken to select a detonating cord consistent with the type and physical condition of the bore hole and stemming and the type of explosives used.

40.10.2. Detonating cord shall be handled and used with the same respect and care given other explosives.

40.10.3. The line of detonating cord extending out of a bore hole or from a charge shall be cut from the supply spool before loading the remainder of the bore hole or placing additional charges.

40.10.4. Detonating cord shall be handled and used with care to avoid damaging or severing the cord during and after loading and hooking-up.

40.10.5. Detonating cord connections shall be competent and positive in accordance with approved and recommended methods. Knot-type or other cord-to-cord connections shall be made only with detonating cord in which the explosive core is dry.

40.10.6. All detonating cord trunk lines and branch lines shall be free of loops, sharp kinks, or angles that direct the cord back toward the oncoming line of detonation.

40.10.7. All detonating cord connections shall be inspected before firing the blast.

40.10.8. When detonating cord millisecond-delay connectors or short-interval-delay electric blasting caps are used with detonating cord, the practice shall conform strictly to the manufacturer's recommendations.

40.10.9. When connecting a blasting cap or an electric blasting cap to detonating cord, the cap shall be taped or otherwise attached securely along the side or the end of the detonating cord, with the end of the cap containing the explosive charge pointed in the direction in which the detonation is to proceed.

40.10.10. Detonators for firing the trunk line shall not be brought to the loading area nor attached to the detonating cord until everything else is in readiness for the blast.

40.11. Firing the blast.

40.11.1. A code of blasting signals shall be posted on one (1) or more conspicuous places at the operation, and all employees shall be required to familiarize themselves with the code and conform to it. Danger signs shall be placed at suitable locations.

40.11.2. Before a blast is fired, a loud warning signal shall be given by the certified blaster in charge, who has made certain that all surplus explosives are in a safe place and all employees, vehicles, and equipment are at a safe distance, or under sufficient cover.

40.11.3. Flagmen shall be safely stationed on highways which pass through the danger zone so as to stop traffic during blasting operations.

40.11.4. It shall be the duty of the blaster to fix the time of blasting.

40.11.5. Before firing an underground blast, warning shall be given, and all possible entries into the blasting area, and any entrances to any working place where a drift, raise, or other opening is about to hole through, shall be carefully guarded. The blaster shall make sure that all employees are out of the blast area before firing a blast.

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**Warning Signal** - A 1-minute series of long blasts 5 minutes prior to blast signal.

**Blast Signal** - A series of short blasts 1 minute prior to the shot.

**All Clear Signal** - A prolonged blast following the inspection of blast area.

40.12. Inspection after blasting.

40.12.1. Immediately after the blast has been fired, the firing line shall be disconnected from the blasting machine, or where power switches are used, they shall be locked open or in the off position.

40.12.2. Sufficient time shall be allowed, not less than fifteen (15) minutes in tunnels, for the smoke and fumes to leave the blasted area before returning to the shot. An inspection of the area and the surrounding rubble shall be made by the certified blaster to determine if all charges have been exploded before employees are allowed to return to the operation, and in tunnels, after the muck pile has been wetted down.

40.13. Misfires.

40.13.1. If a misfire is found, the blaster shall provide proper safeguards for excluding all employees from the danger zone.

40.13.2. No other work shall be done except that necessary to remove the hazard of the misfire and only those employees necessary to do the work shall remain in the danger zone.

40.13.3. No attempt shall be made to extract explosives from any charged or misfired hole; a

new primer shall be put in and the hole reblasted. If refiring of the misfired hole presents a hazard, the explosives may be removed by washing out with water or, where the misfire is under water, blown out with air.

40.13.4. If there are any misfires while using cap and fuse, all employees shall remain away from the charge for at least one (1) hour. Misfires shall be handled under the direction of the person in charge of the blasting. All wires shall be carefully traced and a search made for unexploded charges.

40.13.5. No drilling, digging, or picking shall be permitted until all missed holes have been detonated or the authorized representative has approved that work can proceed.

~~40.1. General provisions:~~

~~(a) After the effective date of the certified surface blasters rules and regulations, all persons performing blasting operations on construction projects shall be certified. The employer shall permit only authorized and qualified persons to handle and use explosives.~~

~~(b) Smoking, firearms, matches, open flame lamps, and other fires, flame or heat producing devices and sparks shall be prohibited in or near explosive magazines or while explosives are being handled, transported or used.~~

~~(c) No person shall be allowed to handle or use explosives while under the influence of intoxicating liquors, narcotics, or other dangerous drugs.~~

~~(d) All explosives shall be accounted for at all times. Explosives not being used shall be kept in a locked magazine, unavailable to persons not authorized to handle them. The employer shall maintain an inventory and use records of all explosives. Appropriate authorities shall be notified of any loss, theft, or unauthorized entry into a magazine.~~

~~(e) No explosives or blasting agents shall be abandoned.~~

~~(f) No fire shall be fought where the fire is in imminent danger of contact with explosives. All employees shall be removed to a safe area and the fire area guarded against intruders.~~

~~(g) Original containers, or Class 2 magazine, shall be used for taking detonators and other explosives from storage magazines to the blasting area.~~

~~(h) When blasting is done in congested areas or in proximity to a structure, railway, or highway, or any other installation that may be damaged, the blaster shall take special precautions in the loading, delaying, initiation, and confinement of each blast with mats or other methods so as to control the throw of fragments, and thus prevent bodily injury to employees.~~

~~(i) Employees authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution including, but not limited to, visual and audible warning signals, flags, or barricades to ensure employee safety.~~

~~(j) Insofar as possible, blasting operations above ground shall be conducted between sunup and sundown.~~

~~(k) Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent power lines, dust storms, or other~~

~~sources of extraneous electricity. These precautions shall include:~~

~~————— (1) Detonators shall be short-circuited in holes which have been primed and shunted until wired into the blasting circuit;~~

~~————— (2) The suspension of all blasting operations and removal of persons from the blasting area during the approach and progress of an electric storm;~~

~~————— (3)~~

~~————— (i) The prominent display of adequate signs warning against the use of mobile radio transmitters on all roads within one thousand (1,000) feet of blasting operations. Whenever adherence to the one thousand (1,000) foot distance would create an operational handicap, a competent person shall be consulted to evaluate the particular situation, and alternative provisions may be made which are adequately designed to prevent any premature firing of electric blasting caps. A description of any such alternatives shall be reduced to writing and shall be certified as meeting the purposes of this subdivision by the competent person consulted. The description shall be maintained at the construction site during the duration of the work and shall be available for inspection by representatives of the Secretary of Labor.~~

~~————— (ii) Specimens of signs which would meet the requirements of subdivision (i) of this subparagraph (3) are the following (See Table 49):~~

~~————— (4) Ensuring that mobile radio transmitters which are less than one hundred (100) feet away from electric blasting caps in other than original containers shall be deenergized and effectively locked.~~

~~————— (5) Compliance with the recommendations of the Institute of the Makers of Explosives with regard to blasting in the vicinity of radio transmitters as stipulated in radio frequency energy—a potential hazard in the use of electric blasting caps, IME publication No. 20, March, 1971.~~

~~————— (l) Empty boxes and paper and fiber packing materials which have previously contained high explosives shall not be used again for any purpose, but shall be destroyed by burning at an approved location.~~

~~————— (m) Explosives, blasting agents, and blasting supplies that are obviously deteriorated or damaged shall not be used.~~

~~————— (n) Delivery and issue of explosives shall only be made by and to authorized persons and into authorized magazines or approved temporary storage or handling areas.~~

~~————— (o) Blasting operations in the proximity of overhead power lines, communication lines, utility services, or other services and structures shall not be carried on until the operators and/or owners have been notified and measures for safe control have been taken.~~

~~————— (p) The use of black powder shall be prohibited.~~

~~————— (q) All loading and firing shall be directed and directly supervised by a competent persons thorough experienced in this field.~~

~~————— (r) All blasts shall be fired electrically with an electric blasting machine or properly designed electric power source, except as provided in paragraphs (a) and (p) of Section 40.8 of these regulations.~~

~~40.2. Explosives and blasting agents:~~~~(a) Buildings used for the mixing of blasting agents shall conform to the requirements of this Section:~~~~(b) Buildings shall be of noncombustible construction or sheet metal on wood studs.~~~~(c) Floors in a mixing plant shall be of concrete or other nonabsorbent materials.~~~~(d) All fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture the oil will drain away from the mixing plant building.~~~~(e) The building shall be well ventilated.~~~~(f) Heating units which do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside the mixing building.~~~~(g) All internal combustion engines used for electric power generation shall be located outside the mixing plant building or shall be properly ventilated and isolated by a fire wall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.~~~~(h) Buildings used for the mixing of water gels shall conform to the requirements of this subdivision.~~~~(i) Buildings shall be of noncombustible construction or sheet metal on wood studs.~~~~(j) Floors in a mixing plant shall be of concrete or of other nonabsorbent materials.~~~~(k) Where fuel oil is used, all fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture, the oil will drain away from the mixing plant building.~~~~(l) The building shall be well ventilated.~~~~(m) Heating units that do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside of the mixing building.~~~~(n) All internal combustion engines used for electric power generation shall be located outside the mixing plant building, or shall be properly ventilated and isolated by a fire wall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.~~~~40.3. Blaster qualifications:~~~~(a) A blaster shall be able to understand and given written and oral orders.~~~~(b) A blaster shall be in good physical condition and not be addicted to narcotics, intoxicants, or similar types of drugs.~~

~~—— (c) A blaster shall be qualified, by training, knowledge, and experience, in the field of transporting, storing, handling, and use of explosives, and have a working knowledge of state and local laws and regulations which pertain to explosives.~~

~~—— (d) Blasters shall be required to furnish satisfactory evidence of competency in handling explosives and performing in a safe manner the type of blasting that will be required.~~

~~—— (e) The blaster shall be knowledgeable and competent in the use of each type of blasting method used.~~

#### ~~—— 40.4. Surface transportation of explosives.~~

~~—— (a) Transportation of explosives shall meet the provisions of the Department of Transportation's regulations contained in 14 CFR Part 103, air transportation; 46 CFR Parts 146-149, water carriers; 49 CFR Parts 171-179, highways and railways; 49 CFR Part 180, pipelines; and 49 CFR Parts 390-397, motor carriers. Motor vehicles or conveyances transporting explosives shall only be driven by, and be in charge of, a licensed driver who is physically fit. He shall be familiar with the local, state, and federal regulations governing the transportation of explosives.~~

~~—— (b) No person shall smoke, or carry matches or any other flame-producing device, nor shall firearms or loaded cartridges be carried while in or near a motor vehicle or conveyance transporting explosives.~~

~~—— (c) Explosives, blasting agents, and blasting supplies shall not be transported with other materials or cargoes. Blasting caps (including electric) shall not be transported in the same vehicle with other explosives.~~

~~—— (d) Vehicles used for transporting explosives shall be strong enough to carry the load without difficulty, and shall be in good mechanical condition.~~

~~—— (e) When explosives are transported by a vehicle with an open body, a Class 2 magazine or original manufacturer's container shall be securely mounted on the bed to contain the cargo.~~

~~—— (f) All vehicles used for the transportation of explosives shall have tight floors and any exposed spark-producing metal on the inside of the body shall be covered with wood or other nonsparking material to prevent contact with containers of explosives.~~

~~—— (g) Every motor vehicle or conveyance used for transporting explosives shall be marked or placarded on both sides, the front, and the rear with the word "Explosives" in red letters, not less than four (4) inches in height, in white background. In addition to such marking or placarding, the motor vehicle or conveyance may display, in such a manner that it will be readily visible from all directions, a red flag eighteen (18) inches x thirty (30) inches, with the word "Explosives" painted, stamped, or sewed thereon, in white letters, at least six (6) inches in height.~~

~~—— (h) Each vehicle used for transportation of explosives shall be equipped with a fully charged fire extinguisher, in good condition. An approved extinguisher of not less than ten (10) ABC rating will meet the minimum requirement. The driver shall be trained in the use of the extinguisher on his vehicle.~~

~~—— (i) Motor vehicles or conveyances carrying explosives, blasting agents, or blasting supplies, shall not be taken inside a garage or shop for repairs or servicing.~~

~~—— (j) No motor vehicle transporting explosives shall be left unattended.~~

~~—— 40.5. Storage of explosives and blasting agents.~~

~~—— (a) Explosives and related materials shall be stored in approved facilities required under the applicable provisions of the Internal Revenue Service regulations contained in 26 CFR 181, Commerce in Explosives.~~

~~—— (b) Blasting caps, electric blasting caps, detonating primers, and primed cartridges shall not be stored in the same magazine with other explosives or blasting agents.~~

~~—— (c) Smoking and open flames shall not be permitted within fifty (50) feet of explosives and detonator storage magazines.~~

~~—— 40.6. Loading of explosives or blasting agents.~~

~~—— (a) Procedures that permit safe and efficient loading shall be established before loading is started.~~

~~—— (b) All drill holes shall be sufficiently large to admit freely the insertion of the cartridges of explosives.~~

~~—— (c) Tamping shall be done only with wood rods or plastic tamping poles without exposed metal parts, but nonsparking metal connectors may be used for jointed poles. Violent tamping shall be avoided. The primer shall never be tamped.~~

~~—— (d) No holes shall be loaded except those to be fired in the next round of blasting. After loading, all remaining explosives and detonators shall be immediately returned to an authorized magazine.~~

~~—— (e) Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges and, if any are found, they shall be refired before work proceeds.~~

~~—— (f) No person shall be allowed to deepen drill holes which have contained explosives or blasting agents.~~

~~—— (g) No explosives or blasting agents shall be left unattended at the blast site.~~

~~—— (h) Machines and all tools not used for loading explosives into bore holes shall be removed from the immediate location of holes before explosives are delivered. Equipment shall not be operated within fifty (50) feet of loaded holes.~~

~~—— (i) No activity of any nature other than that which is required for loading holes with explosives shall be permitted in a blast area.~~

~~—— (j) Power lines and portable electric cables for equipment being used shall be kept a safe distance from explosives or blasting agents being loaded into drill holes. Cables in the proximity of the blast area shall be deenergized and locked out by the blaster.~~

~~—— (k) Holes shall be checked prior to loading to determine depth and conditions. Where a hole has been loaded with explosives but the explosives have failed to detonate, there shall be no drilling within fifty (50) feet of the hole.~~

~~—— (l) When loading a long line of holes with more than one (1) loading crew, the crews shall be separated by practical distance consistent with efficient operation and supervision of crews.~~

~~—— (m) No explosives shall be loaded or used underground in the presence of combustible gases or combustible dusts.~~

~~—— (n) No explosives other than those in fume Class 1 shall be used; however, explosives complying with the requirements of fume Class 2 and fume Class 3 may be used if adequate ventilation has been provided.~~

~~—— (o) All blast holes in openwork shall be stemmed to the collar or to a point which will confine the charge.~~

~~—— (p) Warning signs, indicating a blast area, shall be maintained at all approaches to the blast area. The warning sign lettering shall be not less than four (4) inches in height on a contrasting background.~~

~~—— (q) A bore hole shall never be sprung when it is adjacent to or near a hole that is loaded. Flashlight batteries shall not be used for springing holes.~~

~~—— (r) Drill holes which have been sprung or chambered, and which are not water filled, shall be allowed to cool before explosives are loaded.~~

~~—— (s) No loaded holes shall be left unattended or unprotected.~~

~~—— (t) The blaster shall keep an accurate, up-to-date record of explosives, blasting agents, and blasting supplies used in a blast and shall keep an accurate running inventory of all explosives and blasting agents stored on the operation.~~

#### ~~—— 40.7. Explosives and blasting agents.~~

~~—— (a) Semiconductive hose. Semiconductive hose a hose with an electrical resistance high enough to limit flow of stray electric currents to safe levels, yet not so high as to prevent drainage of static electric charges to ground; hose of not more than two (2) megohms resistance over its length and of not less than five thousand (5,000) ohms per foot meets the requirements.~~

~~—— (b) When loading blasting agents pneumatically over electric blasting caps, semiconductive delivery hose shall be used and the equipment shall be bonded and grounded.~~

#### ~~—— 40.8. Initiation of explosive charges--electric blasting.~~

~~—— (a) Electric blasting caps shall not be used where sources of extraneous electricity make the use of electric blasting caps dangerous. Blasting cap leg wires shall be kept short-circuited (shunted) until they are connected into the circuit for firing.~~

~~—— (b) Before adopting any system of electrical firing, the blaster shall conduct a thorough survey for extraneous currents, and all dangerous currents shall be eliminated before any holes are loaded.~~

~~—— (c) In any single blast using electric blasting caps, all caps shall be of the same style or function, and of the same manufacture.~~

~~—— (d) Electric blasting shall be carried out by using blasting circuits or power circuits in accordance~~

~~with the electric blasting cap manufacturer's recommendations, or an approved contractor or his designated representative:~~

~~—— (e) When firing a circuit of electric blasting caps, care must be exercised to ensure that an adequate quantity of delivered current is available, in accordance with the manufacturer's recommendations:~~

~~—— (f) Connecting wires and lead wires shall be insulated single solid wires of sufficient current-carrying capacity:~~

~~—— (g) Bus wires shall be solid single wires of sufficient current-carrying capacity:~~

~~—— (h) When firing electrically, the insulation on all firing lines shall be adequate and in good condition:~~

~~—— (i) A power circuit used for firing electric blasting caps shall not be grounded:~~

~~—— (j) When firing from a power circuit, the firing switch shall be locked in the open or "Off" position at all times, except when firing. It shall be so designed that the firing lines to the cap circuit are automatically shortcircuited when the switch is in the "Off" position. Keys to this switch shall be entrusted only to the blaster:~~

~~—— (k) Blasting machines shall be in good condition and the efficiency of the machine shall be tested periodically to make certain that it can deliver power at its rated capacity:~~

~~—— (l) When firing with blasting machines, the connections shall be made as recommended by the manufacturer of the electric blasting caps used:~~

~~—— (m) The number of electric blasting caps connected to a blasting machine shall not be in excess of its rated capacity. Furthermore, in primary blasting, a series circuit shall contain no more caps than the limits recommended by the manufacturer of the electric blasting caps in use:~~

~~—— (n) The blaster shall be in charge of the blasting machines, and no other person shall connect the leading wires to the machine:~~

~~—— (o) Blasters, when testing circuits to charged holes, shall use only blasting galvanometers equipped with a silver chloride cell especially designed for this purpose:~~

~~—— (p) Whenever the possibility exists that a leading line or blasting wire might be thrown over a live power line by the force of an explosion, care shall be taken to see that the total length of wires are kept too short to hit the lines or that the wires are securely anchored to the ground. If neither of these requirements can be satisfied, a nonelectric system shall be used:~~

~~—— (q) In electrical firing, only the man making leading wire connections shall fire the shot. All connections shall be made from the bore hole back to the source of firing current, and the leading wires shall remain shorted and not be connected to the blasting machine or other source of current until the charge is to be fired:~~

~~—— (r) After firing an electric blast from a blasting machine, the leading wires shall be immediately disconnected from the machine and short-circuited:~~

~~40.9. Use of safety fuse.~~

~~(a) Safety fuse shall only be used where sources of extraneous electricity make the use of electric blasting caps dangerous. The use of a fuse that has been hammered or injured in any way shall be forbidden.~~

~~(b) The handling of a fuse on nails or other projections which will cause a sharp bend to be formed in the fuse is prohibited.~~

~~(c) Before capping safety fuse, a short length shall be cut from the end of the supply reel so as to assure a fresh cut end in each blasting cap.~~

~~(d) Only a cap crimper of approved design shall be used for attaching blasting caps to safety fuse. Crimpers shall be kept in good repair and accessible for use.~~

~~(e) No unused cap or short capped fuse shall be placed in any hole to be blasted, such unused detonators shall be removed from the working place and destroyed.~~

~~(f) No fuse shall be capped, or primers made up, in any magazine or near any possible source of ignition.~~

~~(g) No one shall be permitted to carry detonators or primers of any kind on his person.~~

~~(h) The minimum length of safety fuse to be used in blasting shall be as required by state law, but shall not be less than thirty (30) inches.~~

~~(i) At least two (2) men shall be present when multiple cap and fuse blasting is done by hand lighting methods.~~

~~(j) Not more than twelve (12) fuses shall be lighted by each blaster when hand lighting devices are used. However, when two (2) or more safety fuses in a group are lighted as one (1) by means of igniter cord, or other similar fuse-lighting devices, they may be considered as one (1) fuse.~~

~~(k) The so-called "drop fuse" method of dropping or pushing a primer or any explosive with a lighted fuse attached is forbidden.~~

~~(l) Cap and fuse shall not be used for firing mudcap charges unless charges are separated sufficiently to prevent one (1) charge from dislodging other shots in the blast.~~

~~(m) When blasting with safety fuses, consideration shall be given to the length and burning rate of the fuse. Sufficient time, with a margin of safety, shall always be provided for the blaster to reach a place of safety.~~

~~40.10. Use of detonating cord.~~

~~(a) Care shall be taken to select a detonating cord consistent with the type and physical condition of the bore hole and stemming and the type of explosives used.~~

~~(b) Detonating cord shall be handled and used with the same respect and care given other explosives.~~

~~———— (c) The line of detonating cord extending out of a bore hole or from a charge shall be cut from supply spool before loading the remainder of the bore hole or placing additional charges.~~

~~———— (d) Detonating cord shall be handled and used with care to avoid damaging or severing the cord during and after loading and hooking up.~~

~~———— (e) Detonating cord connections shall be competent and positive in accordance with approved and recommended methods. Knot-type or other cord-to-cord connections shall be made only with detonating cord, in which the explosive cord is dry.~~

~~———— (f) All detonating cord trunk lines and branch lines shall be free of loops, sharp kinks, or angles that direct the cord back toward the oncoming line of detonation.~~

~~———— (g) All detonating cord connections shall be inspected before firing the blast.~~

~~———— (h) When detonating cord millisecond-delay connectors or short-interval-delay electric blasting caps are used with detonating cord, the practice shall conform strictly to the manufacturer's recommendations.~~

~~———— (i) When connecting a blasting cap or an electric blasting cap to detonating cord, the cap shall be taped or otherwise attached securely along the side or the end of the detonating cord, with the end of the cap containing the explosive charge pointed in the direction in which the detonation is to proceed.~~

~~———— (j) Detonators for firing the trunk line shall not be brought to the loading area nor attached to the detonating cord until everything else is in readiness for the blast.~~

#### ~~———— 40.11. Firing the blast.~~

~~———— (a) A code of blasting signals shall be posted on one (1) or more conspicuous places at the operation, and all employees shall be required to familiarize themselves with the code and conform to it. Danger signs shall be placed at suitable locations.~~

~~———— (b) Before a blast is fired, a loud warning signal shall be given by the certified blaster in charge, who has made certain that all surplus explosives are in a safe place and all employees, vehicles, and equipment are at a safe distance or under sufficient cover.~~

~~———— (c) Flagmen shall be safely stationed on highways which pass through the danger zone so as to stop traffic during blasting operations.~~

~~———— (d) It shall be the duty of the blaster to fix the time of blasting.~~

~~———— (e) Before firing an underground blast, warning shall be given, and all possible entries into the blasting area and any entrances to any working place where a drift, raise, or other opening is about to hole through, shall be carefully guarded. The blaster shall make sure that all employees are out of the blast area before firing a blast.~~

#### **TABLE U-1**

**Warning Signal** - A 1-1 minute series of long blasts 5 minutes prior to blast signal.

**Blast Signal** - A series of short blasts 1 minute prior to the shot.

**All Clear Signal** - A prolonged blast following the inspection of blast area.

~~40.12. Inspection after blasting.~~

~~(a) Immediately after the blast has been fired, the firing line shall be disconnected from the blasting machine, or where power switches are used, they shall be locked open or in the off position.~~

~~(b) Sufficient time shall be allowed, not less than fifteen (15) minutes in tunnels, for the smoke and fumes to leave the blasted area before returning to the shot. An inspection of the area and the surrounding rubble shall be made by the certified blaster to determine if all charges have been exploded before employees are allowed to return to the operation, and in tunnels, after the muck pile has been wetted down.~~

~~40.13. Misfires.~~

~~(a) If a misfire is found, the blaster shall provide proper safeguards for excluding all employees from the danger zone.~~

~~(b) No other work shall be done except that necessary to remove the hazard of the misfire and only those employees necessary to do the work shall remain in the danger zone.~~

~~(c) No attempt shall be made to extract explosives from any charged or misfired hole; a new primer shall be put in and the hole reblasted. If misfiring of the misfired hole presents a hazard, the explosives may be removed by washing out with water or, where the misfire is under water, blown out with air.~~

~~(d) If there are any misfires while using cap and fuse, all employees shall remain away from the charge for at least one (1) hour. Misfires shall be handled under the direction of the person in charge of the blasting. All wires shall be carefully traced and a search made for unexploded charges.~~

~~(e) No drilling, digging, or picking shall be permitted until all missed holes have been detonated or the authorized representative has approved that work can proceed.~~

~~40.14. Definitions applicable to this subsection.~~

~~(a) "Approved storage facility" a facility for the storage of explosive material conforming to the requirements of this subpart and covered by a license or permit.~~

~~(b) "Blast area" the area in which explosive loading and blasting operations are being conducted.~~

~~(c) "Blaster" the person or persons authorized to use explosives for blasting purposes and meeting the qualifications in these rules and regulations.~~

~~(d) "Blasting agent" a blasting agent is any material or mixture consisting of a fuel and oxidizer used for blasting, but not classified an explosive and in which none of the ingredients is classified as an explosive provided the furnished (mixed) product cannot be detonated with a No. 8 test blasting cap when confined. A common blasting agent presently in use is a mixture of ammonia nitrate (NH<sub>4</sub> NO<sub>3</sub>) and carbonaceous combustibles, such as fuel oil or coal, and may either be procured, premixed and packaged from explosive companies or mixed in the field.~~

~~(e) "Blasting cap" a metallic tube closed at one (1) end, containing a charge of one (1) or more detonating compounds, and designed for and capable of detonation from the sparks or flame from a safety fuse inserted and crimped into the open end.~~

~~———— (f) “Block holing” the breaking of boulders or blasting agents by firing a charge of explosives that has been loaded in a drill hole:~~

~~———— (g) “Conveyance” any unit for transporting explosives or blasting agents including, but not limited to, trucks, trailers, rail cars, barges and vessels:~~

~~———— (h) “Detonating cord” a flexible cord containing a center core of high explosives which when detonated will have sufficient strength to detonate other cap-sensitive explosives with which it is in contact:~~

~~———— (i) “Detonator” blasting caps, electric blasting caps, delay electric blasting caps, and nonelectric delay blasting caps:~~

~~———— (j) “Electric blasting cap” a blasting cap designed for and capable of detonation by means of an electric current:~~

~~———— (k) “Electric blasting circuitry”:~~

~~———— (1) Bus wire. An expandable wire, used in parallel or series, in parallel circuits, to which are connected the leg wires of electric blasting caps:~~

~~———— (2) Connecting wire. An insulated expendable wire used between electric blasting caps and the leading wires or between the bus wire and the leading wires:~~

~~———— (3) Leading wire. An insulated wire used between the electric power source and the electric blasting cap circuit:~~

~~———— (4) Permanent blasting wire. A permanently mounted insulated wire used between the electric power source and the electric blasting circuit:~~

~~———— (l) “Electric delay blasting caps” caps designed to detonate at a predetermined period of time after energy is applied to the ignition system:~~

~~———— (m) “Explosives”:~~

~~———— (1) Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion; that is, with substantially instantaneous release of gas and heat:~~

~~———— (2) All material which is classified as Class A, Class B, and Class C explosives by the West Virginia department of mines:~~

~~———— (3) Classification of explosives by the West Virginia department of mines is as follows:~~

~~———— Class A explosives. Possessing detonating hazard, such as dynamite, nitroglycerin, picric acid, lead azide, fulminate of mercury, black powder, blasting caps, and detonating primers:~~

~~———— Class B explosives. Possessing flammable hazard, such as propellant explosives, including some smokeless propellants:~~

~~———— Class C explosives. Include certain types of manufactured articles which contain Class A or Class B explosives, or both, as components, but in restricted quantities:~~

~~———— (n) "Fuse lighters" special devices for the purpose of igniting safety fuse.~~

~~———— (o) "Magazine" any building or structure, other than an explosives manufacturing building, used for the storage of explosives.~~

~~———— (p) "Misfire" an explosive charge which failed to detonate.~~

~~———— (q) "Mud-capping" (sometimes known as bulldozing, adobe blasting, or adobying) the blasting of boulders by placing a quantity of explosives in a drill hole.~~

~~———— (r) "Nonelectric delay blasting cap" a blasting cap with an integral delay element in conjunction with and capable of being detonated by a detonation impulse or signal from miniaturized detonating cord.~~

~~———— (s) "Primary blasting" the blasting operation by which the original rock formation is dislodged from its natural location.~~

~~———— (t) "Primer" a cartridge or container of explosives into which a detonator or detonating cord is inserted or attached.~~

~~———— (u) "Safety fuse" a flexible cord containing an integral burning medium by which fire is conveyed at a continuous and uniform rate for the purpose of firing blasting caps.~~

~~———— (v) "Secondary blasting" the reduction of oversize material by the use of explosives to the dimension required for handling, including mud-capping and blockholding.~~

~~———— (w) "Stemming" a suitable inert incombustible material or device used to confine or separate explosives in a drill hole, or to cover explosives in mud-capping.~~

~~———— (x) "Springing" the creation of a pocket in the bottom of a drill hole by the use of a moderate quantity of explosives in order that larger quantities of explosives may be inserted therein.~~

~~———— (y) "Water gels" or "slurry explosives" a wide variety of materials used for blasting. They all contain substantial proportions of water and high proportions of ammonium nitrate, some of which is in solution in the water.~~

~~———— Two (2) broad classes of water gels are:~~

~~———— (1) Those which are sensitized by a material classed as a explosive, such as TNT or smokeless powder; and~~

~~———— (2) Those which contain no ingredient classified as an explosive; these are sensitized with metals such as aluminum or with other fuels.~~

~~———— Water gels may be premixed at an explosive plant or mixed at the site immediately before delivery into the bore hole.~~

#### **~~§36-23-41. Rollover Protective Structures; Overhead Protection:~~**

~~———— 41.1. Rollover protective structures (ROPS) for material handling equipment. All such equipment shall be equipped with rollover protective structures which meet the minimum performance standards prescribed in MSHA Safety and Health Regulations for Construction, 1926.1000.~~

**§36-23-41. Fall Protection.****41.1. Scope and application.**

41.1.1. This Section sets forth requirements and criteria for fall protection in construction workplaces covered under 29 CFR OSHA §1926. Exception: The provisions of this Section do not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.

41.1.2. Section 41.3. sets forth those workplaces, conditions, operations, and circumstances for which fall protection shall be provided except as follows:

41.1.2.a. Requirements relating to fall protection for employees working on scaffolds are provided in Section 33.

41.1.2.b. Requirements relating to fall protection for employees working on cranes and derricks are provided in Section 42.

41.1.2.c. Fall protection requirements for employees performing steel erection work (except for towers and tanks) are provided in Section 38.

41.1.2.d. Requirements relating to fall protection for employees working on stairways and ladders are provided in Section 33.1.

41.1.3. Section 41.4. sets forth the requirements for the installation, construction, and proper use of fall protection required by this rule, except as follows:

41.1.3.a. Performance requirements for guardrail systems used on scaffolds and performance requirements for falling object protection used on scaffolds are provided in Section 33.2.

41.1.3.b. Performance requirements for stairways, stairrail systems, and handrails are provided in Subsections 33.1.2. and 33.1.3.

41.1.3.c. Criteria for steps, handholds, ladders, and grabrails/guardrails/railings required by Section 42 are provided in Section 42. Subsections 41.4.1., 41.4.3. through 41.4.5., and 41.4.9. apply to activities covered under Section 42 unless otherwise stated in Section 42. No other requirements of Section 41.4. apply to Section 42.

41.1.4. Section 41.5. sets forth requirements for training in the installation and use of fall protection systems, except in relation to steel erection activities and the use of equipment covered by Section 42.

**41.2. Definitions applicable to this Section.**

41.2.a. "Anchorage" shall mean a secure point of attachment for lifelines, lanyards or deceleration devices.

41.2.b. "Body belt" ("safety belt") shall mean a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

41.2.c. "Body harness" shall mean straps which may be secured about the employee in a manner

that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

41.2.d. "Buckle" shall mean any device for holding the body belt or body harness closed around the employee's body.

41.2.e. "Connector" shall mean a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

41.2.f. "Controlled access zone" ("CAZ") shall mean an area in which certain work (e.g., overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

41.2.g. "Dangerous equipment" shall mean equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

41.2.h. "Deceleration device" shall mean any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

41.2.i. "Deceleration distance" shall mean the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

41.2.j. "Equivalent" shall mean alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

41.2.k. "Failure" shall mean load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

41.2.l. "Free fall" shall mean the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

41.2.m. "Free fall distance" shall mean the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

41.2.n. "Guardrail system" shall mean a barrier erected to prevent employees from falling to lower levels.

41.2.o. "Hole" shall mean a gap or void two (2) inches or more in its least dimension, in a floor, roof, or other walking/working surface.

41.2.p. "Infeasible" shall mean that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

41.2.q. "Lanyard" shall mean a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

41.2.r. "Leading edge" shall mean the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

41.2.s. "Lifeline" shall mean a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

41.2.t. "Low-slope roof" shall mean a roof having a slope less than or equal to four (4) in twelve (12) (vertical to horizontal).

41.2.u. "Lower levels" shall mean those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

41.2.v. "Mechanical equipment" shall mean all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

41.2.w. "Opening" shall mean a gap or void thirty (30) inches or more high and eighteen (18) inches or more wide, in a wall or partition, through which employees can fall to a lower level.

41.2.x. "Overhand bricklaying" and "related work" shall mean the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

41.2.y. "Personal fall arrest system" shall mean a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

41.2.z. "Positioning device system" shall mean a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

41.2.aa. "Rope grab" shall mean a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

41.2.bb. "Roof" shall mean the exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily become the top surface of a building.

41.2.cc. "Roofing work" shall mean the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

41.2.dd. "Safety-monitoring system" shall mean a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

41.2.ee. "Self-retracting lifeline/lanyard" shall mean a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

41.2.ff. "Snaphook" shall mean a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types:

41.2.ff.1. The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or

41.2.ff.2. The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snaphook as part of personal fall arrest systems and positioning device systems is prohibited.

41.2.gg. "Steep roof" shall mean a roof having a slope greater than four (4) in twelve (12) (vertical to horizontal).

41.2.hh. "Toeboard" shall mean a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

41.2.ii. "Unprotected sides and edges" shall mean any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least thirty-nine (39) inches high.

41.2.ji. "Walking/working surface" shall mean any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

41.2.kk. "Warning line system" shall mean a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

41.2.ll. "Work area" shall mean that portion of a walking/working surface where job duties are being performed.

41.3. Duty to have fall protection.

41.3.1. General.

41.3.1.a. This Section sets forth requirements for employers to provide fall protection systems. All fall protection required by this Section shall conform to the criteria set forth in §36-23-41.4. (fall protection systems criteria and practices). Specific requirements relating to fall protection for employees working in the following areas are specified in the sections of this rule relating to:

41.3.1.a.1. Scaffolds.41.3.1.a.2. Cranes and derricks.41.3.1.a.3. Performing steel erection.41.3.1.a.4. Stairways and ladders.

41.3.1.b. The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

41.3.2. Specific requirements.

41.3.2.a. Unprotected sides and edges. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is six (6) feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

41.3.2.b. Leading edges.

41.3.2.b.1. Each employee who is constructing a leading edge six (6) feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of §36-23-41.4.11.

41.3.2.b.1.A. There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §36-23-41.4.11. for a particular workplace situation, in lieu of implementing any of those systems.

41.3.2.b.2. Each employee on a walking/working surface six (6) feet or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

41.3.2.c. Hoist areas. Each employee in a hoist area shall be protected from falling six (6) feet or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, (or chain, gate, or guardrail] or portions thereof), are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the

access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

41.3.2.d. Holes.

41.3.2.d.1. Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than six (6) feet above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes.

41.3.2.d.2. Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.

41.3.2.d.3. Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

41.3.2.e. Formwork and reinforcing steel. Each employee on the face of formwork or reinforcing steel shall be protected from falling six (6) feet or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

41.3.2.f. Ramps, runways, and other walkways. Each employee on ramps, runways, and other walkways shall be protected from falling six (6) feet or more to lower levels by guardrail systems.

41.3.2.g. Excavations.

41.3.2.g.1. Each employee at the edge of an excavation six (6) feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier;

41.3.2.g.2. Each employee at the edge of a well, pit, shaft, and similar excavation six (6) feet or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

41.3.2.h. Dangerous equipment.

41.3.2.h.1. Each employee less than six (6) feet above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards.

41.3.2.h.2. Each employee six (6) feet or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

41.3.2.i. Overhand bricklaying and related work.

41.3.2.i.1. Except as otherwise provided in §36-23-41.3.2., each employee performing overhand bricklaying and related work six (6) feet or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.

41.3.2.i.2. Each employee reaching more than ten (10) inches below the level of the walking/working surface on which they are working, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

41.3.2.i.2.A. Bricklaying operations performed on scaffolds are regulated by §36-23-33 (Ladders and Scaffolding).

41.3.2.i. Roofing work on low-slope roofs. Except as otherwise provided in §36-23-41.3.2., each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges six (6) feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs fifty (50) feet or less in width, the use of a safety monitoring system alone (i.e. without the warning line system) is permitted.

41.3.2.k. Steep roofs. Each employee on a steep roof with unprotected sides and edges six (6) feet or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems.

41.3.2.l. Precast concrete erection. Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof “tees”) and related operations such as grouting of precast concrete members, who is six (6) feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems, unless another provision in §36-23-41.3.2. provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of §36-23-41.4.11.

41.3.2.l.1. There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §36-23-41.4.11. for a particular workplace situation, in lieu of implementing any of those systems.

41.3.2.m. Wall openings. Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is six (6) feet or more above lower levels and the inside bottom edge of the wall opening is less than thirty-nine (39) inches above the walking/working surface, shall be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.

41.3.2.n. Walking/working surfaces not otherwise addressed. Except as provided in §§36-23-41.3.2.a. through 36-23-41.3.2.m., each employee on a walking/working surface six (6) feet or more above lower levels shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

41.3.3. Protection from falling objects. When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures:

41.3.3.a. Erect toeboards, screens, or guardrail systems to prevent objects from falling from higher levels; or,

41.3.3.b. Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or,

41.3.3.c. Barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that

those objects would not go over the edge if they were accidentally displaced.

#### 41.4. Fall protection systems criteria and practices.

##### 41.4.1. General.

41.4.1.a. Fall protection systems required shall comply with the applicable provisions.

41.4.1.b. Employers shall provide and install all fall protection systems required for an employee, and shall comply with all other pertinent requirements of this Section before that employee begins the work that necessitates the fall protection.

41.4.2. Guardrail systems. Guardrail systems and their use shall comply with the following provisions:

41.4.2.a. Top edge height of top rails, or equivalent guardrail system members, shall be forty-two (42) inches plus or minus three (3) inches above the walking/working level. When conditions warrant, the height of the top edge may exceed the forty-five (45) inch height, provided the guardrail system meets all other criteria of this Subsection.

41.4.2.a.1. When employees are using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.

41.4.2.b. Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least twenty-one (21) inches high.

41.4.2.b.1. Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

41.4.2.b.2. Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

41.4.2.b.3. Intermediate members (such as balusters), when used between posts, shall be not more than nineteen (19) inches apart.

41.4.2.b.4. Other structural members (such as additional midrails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than nineteen (19) inches wide.

41.4.2.c. Guardrail systems shall be capable of withstanding, without failure, a force of at least two hundred (200) pounds applied within two (2) inches of the top edge, in any outward or downward direction, at any point along the top edge.

41.4.2.d. When the two hundred (200) pound test load specified in §36-23-41.4.2.c. is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than thirty-nine (39) inches above the walking/working level.

41.4.2.e. Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least one hundred fifty (150) pounds applied in any downward or outward direction at any point along the midrail or other

member.

41.4.2.f. Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

41.4.2.g. The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

41.4.2.h. Steel banding and plastic banding shall not be used as top rails or midrails.

41.4.2.i. Top rails and midrails shall be at least one-fourth (1/4) inch nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than six (6) foot intervals with high-visibility material.

41.4.2.j. When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.

41.4.2.k. When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.

41.4.2.l. When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two (2) sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.

41.4.2.m. When guardrail systems are used around holes which are used as points of access (such as ladderways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.

41.4.2.n. Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

41.4.2.o. Manila, plastic or synthetic rope being used for top rails or midrails shall be inspected as frequently as necessary to ensure that it continues to meet the strength requirements of Subdivision 41.3.2.c.

41.4.3. Safety net systems. Safety net systems and their use shall comply with the following provisions:

41.4.3.a. Safety nets shall be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than thirty (30) feet below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net shall be unobstructed.

41.4.3.b. Safety nets shall extend outward from the outermost projection of the work surface as follows:

<u>Vertical distance from working level to horizontal plane of net</u>	<u>Minimum required horizontal distance of outer edge of net from the edge of the working surface</u>
<u>Up to 5 feet</u>	<u>8 feet</u>
<u>More than 5 feet up to 10 feet</u>	<u>10 feet</u>
<u>More than 10 feet</u>	<u>13 feet</u>

41.4.3.c. Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in §36-23-41.4.3.d.

41.4.3.d. Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in §36-23-41.4.3.d.1.

41.4.3.d.1. Except as provided in §36-23-41.4.3.d.2., safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at six (6) month intervals if left in one place. The drop-test shall consist of a four hundred (400) pound bag of sand between twenty-eight (28) and thirty-two (32) inches in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than forty-two (42) inches above that level.

41.4.3.d.2. When the employer can demonstrate that it is unreasonable to perform the drop-test required by §36-23-41.4.3.d.1., the employer (or a designated competent person) shall certify that the net and net installation is in compliance with the provisions of §§36-23-41.4.3.c. and 36-23-41.4.3.d.1. by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with §36-23-41.4.3.c. and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection by interested persons.

41.4.3.e. Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.

41.4.3.f. Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.

41.4.3.g. The maximum size of each safety net mesh opening shall not exceed thirty-six (36) square inches nor be longer than six (6) inches on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than six (6) inches. All mesh crossings shall be secured to prevent enlargement of the mesh opening.

41.4.3.h. Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of five thousand (5,000) pounds.

41.4.3.i. Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than six (6) inches apart.

41.4.4. Personal fall arrest systems. Personal fall arrest systems and their use shall comply with the provisions set forth below. Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system. Note: The use of a body belt in a positioning device system is acceptable and is regulated under §36-23-41.4.5.

41.4.4.a. Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

41.4.4.b. Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.

41.4.4.c. Dee-rings and snaphooks shall have a minimum tensile strength of five thousand (5,000) pounds.

41.4.4.d. Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of three thousand six hundred (3,600) pounds without cracking, breaking, or taking permanent deformation.

41.4.4.e. Snaphooks shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member.

41.4.4.f. Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

41.4.4.f.1. directly to webbing, rope or wire rope;

41.4.4.f.2. to each other;

41.4.4.f.3. to a dee-ring to which another snaphook or other connector is attached;

41.4.4.f.4. to a horizontal lifeline; or

41.4.4.f.5. to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

41.4.4.g. On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.

41.4.4.h. Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two (2).

41.4.4.i. Lanyards and vertical lifelines shall have a minimum breaking strength of five thousand (5,000) pounds.

41.4.4.i. When vertical lifelines are used, each employee shall be attached to a separate lifeline. Except that during the construction of elevator shafts, two (2) employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is ten thousand (10,000) pounds (five thousand (5,000) pounds per employee attached); and all other criteria for lifelines have been met.

41.4.4.k. Lifelines shall be protected against being cut or abraded.

41.4.4.l. Self-retracting lifelines and lanyards which automatically limit free fall distance to two (2) feet or less shall be capable of sustaining a minimum tensile load of three thousand (3,000) pounds applied to the device with the lifeline or lanyard in the fully extended position.

41.4.4.m. Self-retracting lifelines and lanyards which do not limit free fall distance to two (2) feet or less, ripstitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of five thousand (5,000) pounds applied to the device with the lifeline or lanyard in the fully extended position.

41.4.4.n. Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.

41.4.4.o. Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least five thousand (5,000) pounds per employee attached, or shall be designed, installed, and used as follows:

41.4.4.o.1. as part of a complete personal fall arrest system which maintains a safety factor of at least two (2); and

41.4.4.o.2. under the supervision of a qualified person.

41.4.4.p. Personal fall arrest systems, when stopping a fall, shall:

41.4.4.p.1. limit maximum arresting force on an employee to nine hundred (900) pounds when used with a body belt;

41.4.4.p.2. limit maximum arresting force on an employee to one thousand eight hundred (1,800) pounds when used with a body harness;

41.4.4.p.3. be rigged such that an employee can neither free fall more than six (6) feet, nor contact any lower level;

41.4.4.p.4. bring an employee to a complete stop and limit maximum deceleration distance an employee travels to three and one-half (3-1/2) feet; and,

41.4.4.p.5. have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of six (6) feet, or the free fall distance permitted by the system, whichever is less.

41.4.4.p.5.A. If the personal fall arrest system meets the criteria and protocols contained in Appendix C to Subpart M of OSHA §1926, and if the system is being used by an employee having a combined person and tool weight of less than three hundred ten (310) pounds, the system will be considered to be in compliance with the provisions of §36-23-41.4.4.p. If the system is used by an employee having a combined tool and body weight of three hundred ten (310) pounds or more, then the employer must appropriately modify the criteria and protocols of the Appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of §36-23-41.4.4.p.

41.4.4.q. The attachment point of the body belt shall be located in the center of the wearer's back. The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.

41.4.4.r. Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

41.4.4.s. Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

41.4.4.t. The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.

41.4.4.u. Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

41.4.4.v. Body belts shall be at least one and five-eighths (1-5/8) inches wide.

41.4.4.w. Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other sections of this rule.

41.4.4.x. When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

41.4.5. Positioning device systems. Positioning device systems and their use shall conform to the following provisions:

41.4.5.a. Positioning devices shall be rigged such that an employee cannot free fall more than two (2) feet.

41.4.5.b. Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or three thousand (3,000) pounds, whichever is greater.

41.4.5.c. Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

41.4.5.d. Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

41.4.5.e. Connecting assemblies shall have a minimum tensile strength of five thousand (5,000) pounds.

41.4.5.f. Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of three thousand six hundred (3,600) pounds without cracking, breaking, or taking permanent deformation.

41.4.5.g. Snaphooks shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member.

41.4.5.h. Unless the snaphook is a locking type and designed for the following connections,

snaphooks shall not be engaged:

41.4.5.h.1. directly to webbing, rope or wire rope;

41.4.5.h.2. to each other;

41.4.5.h.3. to a dee-ring to which another snaphook or other connector is attached;

41.4.5.h.4. to a horizontal lifeline; or

41.4.5.h.5. to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

41.4.5.i. Positioning device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.

41.4.5.j. Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

41.4.6. Warning line systems. Warning line systems (see §36-23-41.3.2.i.) and their use shall comply with the following provisions:

41.4.6.a. The warning line shall be erected around all sides of the roof work area.

41.4.6.a.1. When mechanical equipment is not being used, the warning line shall be erected not less than six (6) feet from the roof edge.

41.4.6.a.2. When mechanical equipment is being used, the warning line shall be erected not less than six (6) feet from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than ten (10) feet from the roof edge which is perpendicular to the direction of mechanical equipment operation.

41.4.6.a.3. Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.

41.4.6.a.4. When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.

41.4.6.b. Warning lines shall consist of ropes, wires, or chains, and supporting stanchions erected as follows:

41.4.6.b.1. The rope, wire, or chain shall be flagged at not more than six (6) foot intervals with high-visibility material;

41.4.6.b.2. The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than thirty-four (34) inches from the walking/working surface and its highest point is no more than thirty-nine (39) inches from the walking/working surface;

41.4.6.b.3. After being erected, with the rope, wire, or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least sixteen (16) pounds applied horizontally against the stanchion, thirty (30) inches above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof, or platform edge;

41.4.6.b.4. The rope, wire, or chain shall have a minimum tensile strength of five hundred (500) pounds, and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in Paragraph 41.4.6.b.3.; and

41.4.6.b.5. The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

41.4.6.c. No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.

41.4.6.d. Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.

41.4.7. Controlled access zones. Controlled access zones (see §§36-23-41.3.2.i. and 36-23-41.4.11.) and their use shall conform to the following provisions:

41.4.7.a. When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

41.4.7.a.1. When control lines are used, they shall be erected not less than six (6) feet nor more than twenty-five (25) feet from the unprotected or leading edge, except when erecting precast concrete members.

41.4.7.a.2. When erecting precast concrete members, the control line shall be erected not less than six (6) feet nor more than sixty (60) feet or half the length of the member being erected, whichever is less, from the leading edge.

41.4.7.a.3. The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

41.4.7.a.4. The control line shall be connected on each side to a guardrail system or wall.

41.4.7.b. When used to control access to areas where overhand bricklaying and related work are taking place:

41.4.7.b.1. The controlled access zone shall be defined by a control line erected not less than ten (10) feet nor more than fifteen (15) feet from the working edge.

41.4.7.b.2. The control line shall extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge.

41.4.7.b.3. Additional control lines shall be erected at each end to enclose the controlled access zone.

41.4.7.b.4. Only employees engaged in overhand bricklaying or related work shall be permitted in the controlled access zone.

41.4.7.c. Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:

41.4.7.c.1. Each line shall be flagged or otherwise clearly marked at not more than six (6) foot intervals with high-visibility material.

41.4.7.c.2. Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than thirty-nine (39) inches from the walking/working surface and its highest point is not more than forty-five (45) inches (fifty (50) inches when overhand bricklaying operations are being performed) from the walking/working surface.

41.4.7.c.3. Each line shall have a minimum breaking strength of two hundred (200) pounds.

41.4.7.d. On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall be enlarged, as necessary, to enclose all points of access, material handling areas, and storage areas.

41.4.7.e. On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

41.4.8. Safety monitoring systems. Safety monitoring systems (see §§36-23-41.3.2.i. and 36-23-41.4.11.) and their use shall comply with the following provisions:

41.4.8.a. The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements:

41.4.8.a.1. The safety monitor shall be competent to recognize fall hazards;

41.4.8.a.2. The safety monitor shall warn the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner;

41.4.8.a.3. The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;

41.4.8.a.4. The safety monitor shall be close enough to communicate orally with the employee; and

41.4.8.a.5. The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.

41.4.8.b. Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.

41.4.8.c. No employee, other than an employee engaged in roofing work (on low-sloped roofs) or an employee covered by a fall protection plan, shall be allowed in an area where an employee is

being protected by a safety monitoring system.

41.4.8.d. Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors.

41.4.9. Covers. Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

41.4.9.a. Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.

41.4.9.b. All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

41.4.9.c. All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

41.4.9.d. All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

41.4.10. Protection from falling objects. Falling object protection shall comply with the following provisions:

41.4.10.a. Toeboards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.

41.4.10.b. Toeboards shall be capable of withstanding, without failure, a force of at least fifty (50) pounds applied in any downward or outward direction at any point along the toeboard.

41.4.10.c. Toeboards shall be a minimum of three and one-half (3-1/2) inches in vertical height from their top edge to the level of the walking/working surface. They shall not have more than one-fourth (1/4) inch clearance above the walking/working surface. They shall be solid or have openings not over one (1) inch in greatest dimension.

41.4.10.d. Where tools, equipment, or materials are piled higher than the top edge of a toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the top of a guardrail system's top rail or midrail, for a distance sufficient to protect employees below.

41.4.10.e. Guardrail systems, when used as falling object protection, shall have all openings small enough to prevent passage of potential falling objects.

41.4.10.f. During the performance of overhand bricklaying and related work:

41.4.10.f.1. No materials or equipment except masonry and mortar shall be stored within four (4) feet of the working edge.

41.4.10.f.2. Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear from the work area by removal at regular intervals.

41.4.10.g. During the performance of roofing work:

41.4.10.g.1. Materials and equipment shall not be stored within six (6) feet of a roof edge unless guardrails are erected at the edge.

41.4.10.g.2. Materials which are piled, grouped, or stacked near a roof edge shall be stable and self-supporting.

41.4.10.h. Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

41.4.11. Fall protection plan. This option is available only to employees engaged in leading edge work or precast concrete erection work (see §§36-23-41.3.2.b. and 36-23-41.3.2.l.) who can demonstrate that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan must conform to the following provisions:

41.4.11.a. The fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction work is being performed and the plan must be maintained up to date.

41.4.11.b. Any changes to the fall protection plan shall be approved by a qualified person.

41.4.11.c. A copy of the fall protection plan with all approved changes shall be maintained at the job site.

41.4.11.d. The implementation of the fall protection plan shall be under the supervision of a competent person.

41.4.11.e. The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are infeasible or why their use would create a greater hazard.

41.4.11.f. The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the employer shall discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.

41.4.11.g. The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones and the employer must comply with the criteria in §36-23-41.4.7. (controlled access zones).

41.4.11.h. Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system in conformance with §36-23-41.4.7. (controlled access zones).

41.4.11.i. The fall protection plan must include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

41.4.11.j. In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss) the employer shall investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and shall implement those changes to prevent similar types of falls or incidents.

41.5. Training requirements.41.5.1. Training program.

41.5.1.a. The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.

41.5.1.b. The employer shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:

41.5.1.b.1. The nature of fall hazards in the work area;

41.5.1.b.2. The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;

41.5.1.b.3. The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;

41.5.1.b.4. The role of each employee in the safety monitoring system when this system is used;

41.5.1.b.5. The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;

41.5.1.b.6. The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection;

41.5.1.b.7. The role of employees in fall protection plans; and

41.5.1.b.8. The standards contained in this Section.

41.5.2. Certification of training.

41.5.2.a. The employer shall verify compliance with §36-23-41.5.1. by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this Section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training.

41.5.2.b. The latest training certification shall be maintained.

41.5.3. Retraining. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by §36-23-41.5.1., the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

41.5.3.a. Changes in the workplace render previous training obsolete; or

41.5.3.b. Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or

41.5.3.c. Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

## **§36-23-42. Cranes and derricks in construction.**

### 42.1. Definitions.

42.1.1. "A/D director" ("Assembly/Disassembly director") shall mean an individual who meets this Section's requirements for an A/D director, irrespective of the person's formal job title or whether the person is non-management or management personnel.

42.1.2. "Articulating crane" shall mean a crane whose boom consists of a series of folding, pin connected structural members, typically manipulated to extend or retract by power from hydraulic cylinders.

42.1.3. "Assembly/Disassembly" shall mean the assembly and/or disassembly of equipment covered under this standard. With regard to tower cranes, "erecting and climbing" replaces the term "assembly," and "dismantling" replaces the term "disassembly." Regardless of whether the crane is initially erected to its full height or is climbed in stages, the process of increasing the height of the crane is an erection process.

42.1.4. "Assist crane" shall mean a crane used to assist in assembling or disassembling a crane.

42.1.5. "Attachments" shall mean any device that expands the range of tasks that can be done by the equipment. Examples include, but are not limited to: An auger, drill, magnet, pile-driver, and boom-attached personnel platform.

42.1.6. "Audible signal" shall mean a signal made by a distinct sound or series of sounds. Examples include, but are not limited to, sounds made by a bell, horn, or whistle.

42.1.7. "Blocking" (also referred to as "cribbing") is wood or other material used to support equipment or a component and distribute loads to the ground. It is typically used to support lattice boom sections during assembly/disassembly and under outrigger and stabilizer floats.

42.1.8. "Boatswain's chair" shall mean a single-point adjustable suspension scaffold consisting of a seat or sling (which may be incorporated into a full body harness) designed to support one employee in a sitting position.

42.1.9. "Bogie" shall mean "travel bogie," which is defined below.

42.1.10. "Boom (equipment other than tower crane)" shall mean an inclined spar, strut, or other long structural member which supports the upper hoisting tackle on a crane or derrick. Typically, the length and vertical angle of the boom can be varied to achieve increased height or height and reach when lifting loads. Booms can usually be grouped into general categories of hydraulically extendible, cantilevered type, latticed section, cable supported type or articulating type.

42.1.11. "Boom (tower cranes)": On tower cranes, if the "boom" (i.e., principal horizontal structure) is fixed, it is referred to as a jib; if it is moveable up and down, it is referred to as a boom.

42.1.12. "Boom angle indicator" shall mean a device which measures the angle of the boom relative to horizontal.

42.1.13. "Boom hoist limiting device" includes boom hoist disengaging device, boom hoist shut-off, boom hoist disconnect, boom hoist hydraulic relief, boom hoist kick-outs, automatic boom stop device, or derricking limiter. This type of device disengages boom hoist power when the boom reaches a predetermined operating angle. It also sets brakes or closes valves to prevent the boom from lowering after power is disengaged.

42.1.14. "Boom length indicator" indicates the length of the permanent part of the boom (such as ruled markings on the boom) or, as in some computerized systems, the length of the boom with extensions/attachments.

42.1.15. "Boom stop" includes boom stops, (belly straps with struts/standoff), telescoping boom stops, attachment boom stops, and backstops. These devices restrict the boom from moving above a certain maximum angle and toppling over backward.

42.1.16. "Boom suspension system" shall mean a system of pendants, running ropes, sheaves, and other hardware which supports the boom tip and controls the boom angle.

42.1.17. "Builder" shall mean the builder/constructor of equipment.

42.1.18. "Center of gravity." The center of gravity of any object is the point in the object around which its weight is evenly distributed. If you could put a support under that point, you could balance the object on the support.

42.1.19. "Certified welder" shall mean a welder who meets nationally recognized certification requirements applicable to the task being performed.

42.1.20. "Climbing" shall mean the process in which a tower crane is raised to a new working height, either by adding additional tower sections to the top of the crane (top climbing), or by a system in which the entire crane is raised inside the structure (inside climbing).

42.1.21. "Come-a-long" shall mean a mechanical device typically consisting of a chain or cable attached at each end that is used to facilitate movement of materials through leverage.

42.1.22. "Competent person" shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

42.1.23. "Controlled load lowering" shall mean lowering a load by means of a mechanical hoist drum device that allows a hoisted load to be lowered with maximum control using the gear train or hydraulic components of the hoist mechanism. Controlled load lowering requires the use of the hoist drive motor, rather than the load hoist brake, to lower the load.

42.1.24. "Controlling entity" shall mean an employer that is a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project--its planning, quality and completion.

42.1.25. "Counterweight" shall mean a weight used to supplement the weight of equipment in

providing stability for lifting loads by counterbalancing those loads.

42.1.26. "Crane/derrick" includes all equipment covered by this Section.

42.1.27. "Crawler crane" shall mean equipment that has a type of base mounting which incorporates a continuous belt of sprocket driven track.

42.1.28. "Crossover points" shall mean locations on a wire rope which is spooled on a drum where one layer of rope climbs up on and crosses over the previous layer. This takes place at each flange of the drum as the rope is spooled onto the drum, reaches the flange, and begins to wrap back in the opposite direction.

42.1.29. "Dedicated channel" shall mean a line of communication assigned by the employer who controls the communication system to only one signal person and crane/derrick or to a coordinated group of cranes/derricks/signal person(s).

42.1.30. "Dedicated pile-driver" is a machine that is designed to function exclusively as a pile-driver. These machines typically have the ability to both hoist the material that will be pile-driven and to pile-drive that material.

42.1.31. "Dedicated spotter (power lines)": To be considered a dedicated spotter, the requirements of §36-23-42.29. (signal person qualifications) must be met and his/her sole responsibility is to watch the separation between the power line and the equipment, load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

42.1.32. "Directly" under the load shall mean a part or all of an employee is directly beneath the load.

42.1.33. "Dismantling" includes partial dismantling (such as dismantling to shorten a boom or substitute a different component).

42.1.34. "Drum rotation indicator" shall mean a device on a crane or hoist which indicates in which direction and at what relative speed a particular hoist drum is turning.

42.1.35. "Electrical contact" occurs when a person, object, or equipment makes contact or comes in close proximity with an energized conductor or equipment that allows the passage of current.

42.1.36. "Employer-made equipment" shall mean floating cranes/derricks designed and built by an employer for the employer's own use.

42.1.37. "Encroachment" is where any part of the crane, load line or load (including rigging and lifting accessories) breaches a minimum clearance distance that this Section requires to be maintained from a power line.

42.1.38. "Equipment" shall mean equipment covered by this Section.

42.1.39. "Equipment criteria" shall mean instructions, recommendations, limitations and specifications.

42.1.40. "Fall protection equipment" shall mean guardrail systems, safety net systems, personal

fall arrest systems, positioning device systems or fall restraint systems.

42.1.41. "Fall restraint system" shall mean a fall protection system that prevents the user from falling any distance. The system is comprised of either a body belt or body harness, along with an anchorage, connectors and other necessary equipment. The other components typically include a lanyard, and may also include a lifeline and other devices.

42.1.42. "Fall zone" shall mean the area (including but not limited to the area directly beneath the load) in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident.

42.1.43. "Flange points" are points of contact between rope and drum flange where the rope changes layers.

42.1.44. "Floating cranes/derricks" shall mean equipment designed by the manufacturer (or employer) for marine use by permanent attachment to a barge, pontoons, vessel or other means of flotation.

42.1.45. "For example" shall mean "one example, although there are others."

42.1.46. "Free fall (of the load line)" shall mean that only the brake is used to regulate the descent of the load line (the drive mechanism is not used to drive the load down faster or retard its lowering).

42.1.47. "Free surface effect" is the uncontrolled transverse movement of liquids in compartments which reduce a vessel's transverse stability.

42.1.48. "Hoist" shall mean a mechanical device for lifting and lowering loads by winding a line onto or off a drum.

42.1.49. "Hoisting" is the act of raising, lowering or otherwise moving a load in the air with equipment covered by this standard. As used in this standard, "hoisting" can be done by means other than wire rope/hoist drum equipment.

42.1.50. "Include/including" shall mean "including, but not limited to."

42.1.51. "Insulating link/device" shall mean an insulating device listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with OSHA 29 CFR §1910.7.

42.1.52. "Jib stop" (also referred to as a "jib backstop"), is the same type of device as a boom stop but is for a fixed or luffing jib.

42.1.53. "Land crane/derrick" is equipment not originally designed by the manufacturer for marine use by permanent attachment to barges, pontoons, vessels, or other means of floatation.

42.1.54. "List" shall mean the angle of inclination about the longitudinal axis of a barge, pontoons, vessel or other means of floatation.

42.1.55. "Load" refers to the object(s) being hoisted and/or the weight of the object(s); both uses refer to the object(s) and the load-attaching equipment, such as, the load block, ropes, slings, shackles, and any other ancillary attachment.

42.1.56. "Load moment (or rated capacity) indicator" shall mean a system which aids the equipment operator by sensing (directly or indirectly) the overturning moment on the equipment, i.e., load multiplied by radius. It compares this lifting condition to the equipment's rated capacity, and indicates to the operator the percentage of capacity at which the equipment is working. Lights, bells, or buzzers may be incorporated as a warning of an approaching overload condition.

42.1.57. "Load moment (or rated capacity) limiter" shall mean a system which aids the equipment operator by sensing (directly or indirectly) the overturning moment on the equipment, i.e., load multiplied by radius. It compares this lifting condition to the equipment's rated capacity, and when the rated capacity is reached, it shuts off power to those equipment functions which can increase the severity of loading on the equipment, e.g., hoisting, telescoping out, or luffing out. Typically, those functions which decrease the severity of loading on the equipment remain operational, e.g., lowering, telescoping in, or luffing in.

42.1.58. "Locomotive crane" shall mean a crane mounted on a base or car equipped for travel on a railroad track.

42.1.59. "Luffing jib limiting device" is similar to a boom hoist limiting device, except that it limits the movement of the luffing jib.

42.1.60. "Marine hoisted personnel transfer device" shall mean a device, such as a "transfer net," that is designed to protect the employees being hoisted during a marine transfer and to facilitate rapid entry into and exit from the device. Such devices do not include boatswain's chairs when hoisted by equipment covered by this standard.

42.1.61. "Marine worksite" shall mean a construction worksite located in, on or above the water.

42.1.62. "Mobile crane" shall mean a lifting device incorporating a cable suspended latticed boom or hydraulic telescopic boom designed to be moved between operating locations by transport over the road.

42.1.63. "Moving point-to-point" shall mean the times during which an employee is in the process of going to or from a work station.

42.1.64. "Multi-purpose machine" shall mean a machine that is designed to be configured in various ways, at least one of which allows it to hoist (by means of a winch or hook) and horizontally move a suspended load. For example, a machine that can rotate and can be configured with removable forks/tongs (for use as a forklift) or with a winch pack, jib (with a hook at the end) or jib used in conjunction with a winch. When configured with the forks/tongs, it is not covered by this Section. When configured with a winch pack, jib (with a hook at the end) or jib used in conjunction with a winch, it is covered by this Section.

42.1.65. "Nationally recognized accrediting agency" is an organization that, due to its independence and expertise, is widely recognized as competent to accredit testing organizations. Examples of such accrediting agencies include, but are not limited to, the National Commission for Certifying Agencies and the American National Standards Institute.

42.1.66. "Nonconductive" shall mean that, because of the nature and condition of the materials used, and the conditions of use (including environmental conditions and condition of the material), the object in question has the property of not becoming energized (that is, it has high dielectric properties offering a high resistance to the passage of current under the conditions of use).

42.1.67. "Operational aids" are devices that assist the operator in the safe operation of the crane by providing information or automatically taking control of a crane function. These include, but are not limited to, the devices listed in §36-23-42.17 (listed operational aids).

42.1.68. "Operational controls" shall mean levers, switches, pedals and other devices for controlling equipment operation.

42.1.69. "Operator" shall mean a person who is operating the equipment.

42.1.70. "Overhead" and "gantry cranes" includes overhead/bridge cranes, semigantry, cantilever gantry, wall cranes, storage bridge cranes, launching gantry cranes, and similar equipment, irrespective of whether it travels on tracks, wheels, or other means.

42.1.71. "Paragraph" refers to a paragraph in the same section of this rule that the word "paragraph" is used, unless otherwise specified.

42.1.72. "Pendants" includes both wire and bar types. Wire type: A fixed length of wire rope with mechanical fittings at both ends for pinning segments of wire rope together. Bar type: Instead of wire rope, a bar is used. Pendants are typically used in a latticed boom crane system to easily change the length of the boom suspension system without completely changing the rope on the drum when the boom length is increased or decreased.

42.1.73. "Personal fall arrest system" shall mean a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

42.1.74. "Portal crane" is a type of crane consisting of a rotating upperstructure, hoist machinery, and boom mounted on top of a structural gantry which may be fixed in one location or have travel capability. The gantry legs or columns usually have portal openings in between to allow passage of traffic beneath the gantry.

42.1.75. "Power lines" shall mean electric transmission and distribution lines.

42.1.76. "Procedures" include, but are not limited to: Instructions, diagrams, recommendations, warnings, specifications, protocols and limitations.

42.1.77. "Proximity alarm" is a device that provides a warning of proximity to a power line and that has been listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with OSHA 29 CFR §1910.7.

42.1.78. "Qualified evaluator (not a third party)" shall mean a person employed by the signal person's employer who has demonstrated that he/she is competent in accurately assessing whether individuals meet the Qualification Requirements in this Section for a signal person.

42.1.79. "Qualified evaluator (third party)" shall mean an entity that, due to its independence and expertise, has demonstrated that it is competent in accurately assessing whether individuals meet the Qualification Requirements in this Section for a signal person.

42.1.80. "Qualified person" shall mean a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the

project.

42.1.81. "Qualified rigger" is a rigger who meets the criteria for a qualified person.

42.1.82. "Range control limit device" is a device that can be set by an equipment operator to limit movement of the boom or jib tip to a plane or multiple planes.

42.1.83. "Range control warning device" is a device that can be set by an equipment operator to warn that the boom or jib tip is at a plane or multiple planes.

42.1.84. "Rated capacity" shall mean the maximum working load permitted by the manufacturer under specified working conditions. Such working conditions typically include a specific combination of factors such as equipment configuration, radii, boom length, and other parameters of use.

42.1.85. "Rated capacity indicator." See "Load moment indicator."

42.1.86. "Rated capacity limiter." See "Load moment limiter."

42.1.87. "Repetitive pickup points" refer to, when operating on a short cycle operation, the rope being used on a single layer and being spooled repetitively over a short portion of the drum.

42.1.88. "Running wire rope" shall mean a wire rope that moves over sheaves or drums.

42.1.89. "Runway" shall mean a firm, level surface designed, prepared and designated as a path of travel for the weight and configuration of the crane being used to lift and travel with the crane suspended platform. An existing surface may be used as long as it meets these criteria.

42.1.90. "Section" shall mean a section of this rule, unless otherwise specified.

42.1.91. "Sideboom crane" shall mean a track-type or wheel-type tractor having a boom mounted on the side of the tractor, used for lifting, lowering or transporting a load suspended on the load hook. The boom or hook can be lifted or lowered in a vertical direction only.

42.1.92. "Special hazard warnings" shall mean warnings of site-specific hazards (for example, proximity of power lines).

42.1.93. "Stability" ("flotation device") shall mean the tendency of a barge, pontoons, vessel or other means of flotation to return to an upright position after having been inclined by an external force.

42.1.94. "Standard Method" shall mean the protocol in Appendix A of OSHA §1926 for hand signals.

42.1.95. "Such as" shall mean "such as, but not limited to."

42.1.96. "Superstructure." See "Upperworks."

42.1.97. "Tagline" shall mean a rope (usually fiber) attached to a lifted load for purposes of controlling load spinning and pendular motions or used to stabilize a bucket or magnet during material handling operations.

42.1.98. "Tender" shall mean an individual responsible for monitoring and communicating with a

diver.

42.1.99. "Tilt up or tilt down operation" shall mean raising/lowering a load from the horizontal to vertical or vertical to horizontal.

42.1.100. "Tower crane" is a type of lifting structure which utilizes a vertical mast or tower to support a working boom (jib) in an elevated position. Loads are suspended from the working boom. While the working boom may be of the fixed type (horizontal or angled) or have luffing capability, it can always rotate to swing loads, either by rotating on the top of the tower (top slewing) or by the rotation of the tower (bottom slewing). The tower base may be fixed in one location or ballasted and moveable between locations. Mobile cranes that are configured with luffing jib and/or tower attachments are not considered tower cranes under this section.

42.1.101. "Travel bogie" ("tower cranes") is an assembly of two (2) or more axles arranged to permit vertical wheel displacement and equalize the loading on the wheels.

42.1.102. "Trim" shall mean angle of inclination about the transverse axis of a barge, pontoons, vessel or other means of floatation.

42.1.103. "Two blocking" shall mean a condition in which a component that is uppermost on the hoist line such as the load block, hook block, overhaul ball, or similar component, comes in contact with the boom tip, fixed upper block or similar component. This binds the system and continued application of power can cause failure of the hoist rope or other component.

42.1.104. "Unavailable procedures" shall mean procedures that are no longer available from the manufacturer, or have never been available, from the manufacturer.

42.1.105. "Upperstructure." See "Upperworks."

42.1.106. "Upperworks" shall mean the revolving frame of equipment on which the operating machinery (and many cases the engine) are mounted along with the operator's cab. The counterweight is typically supported on the rear of the upperstructure and the boom or other front end attachment is mounted on the front.

42.1.107. "Up to" shall mean "up to and including."

42.1.108. "Wire rope" shall mean a flexible rope constructed by laying steel wires into various patterns of multi-wired strands around a core system to produce a helically wound rope.

## 42.2. Training.

42.2.1. The employer must provide training as follows:

42.2.1.a. Overhead powerlines. The employer must train each employee specified in §§36-23-42.9.7 and 36-23-42.11.1.k. in the topics listed in §36-23-42.9.7.

42.2.1.b. Signal persons. The employer must train each employee who will be assigned to work as a signal persons who does not meet the requirements of §36-23-42.29.3. in the areas addressed in that Subsection.

42.2.1.c. Operators.

42.2.1.c.1. The employer must train each operator in accordance with §§36-23-42.28.1. and 36-23-42.28.2. on the safe operation of the equipment the operator will be using.

42.2.1.c.2. The employer must train each operator covered under the exception of §36-23-42.28.1.b. on the safe operation of the equipment the operator will be using.

42.2.1.c.3. The employer must train each operator of the equipment covered by this Section in the following practices:

42.2.1.c.3.A. On friction equipment, whenever moving a boom off a support, first raise the boom a short distance (sufficient to take the load of the boom) to determine if the boom hoist brake needs to be adjusted. On other types of equipment with a boom, the same practice is applicable, except that typically there is no means of adjusting the brake; if the brake does not hold, a repair is necessary. (See §§36-23-42.18.6 and 36-23-42.18.9. for additional requirements.)

42.2.2.c.3.B. Where available, the manufacturer's emergency procedures for halting unintended equipment movement.

42.2.1.d. Competent persons and qualified persons. The employer must train each competent person and each qualified person regarding the requirements of this Section applicable to their respective roles.

42.2.1.e. Crush/pinch points. The employer must train each employee who works with the equipment to keep clear of holes, and crush/pinch points and the hazards addressed in §36-23-42.25. (work area control).

42.2.1.f. Tag-out. The employer must train each operator and each additional employee authorized to start/energize equipment or operate equipment controls (such as maintenance and repair employees), in the tag-out and start-up procedures in §§36-23-42.18.6. and 36-23-42.18.7.

42.2.1.g. Training administration.

42.2.1.g.1. The employer must evaluate each employee required to be trained under this Section to confirm that the employee understands the information provided in the training.

42.2.1.g.2. The employer must provide refresher training in relevant topics for each employee when, based on the conduct of the employee or an evaluation of the employee's knowledge, there is an indication that retraining is necessary.

42.2.1.g.3. Whenever training is required under this Section, the employer must provide the training at no cost to the employee.

42.3. Ground conditions.

42.3.1. Definitions.

42.3.1.a. "Ground conditions" shall mean the ability of the ground to support the equipment (including slope, compaction, and firmness).

42.3.1.b. "Supporting materials" shall mean blocking, mats, cribbing, marsh buggies (in marshes/wetlands), or similar supporting materials or devices.

42.3.2. The equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.

42.3.3. The controlling entity must:

42.3.3.a. Ensure that ground preparations necessary to meet the requirements in §36-23-42.3.2. are provided.

42.3.3.b. Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.

42.3.4. If there is no controlling entity for the project, the requirement in §36-23-42.3.3.a. must be met by the employer that has authority at the site to make or arrange for ground preparations needed to meet §36-23-42.3.2.

42.3.5. If the A/D director or the operator determines that ground conditions do not meet the requirements in §36-23-42.3.2., that person's employer must have a discussion with the controlling entity regarding the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), the requirements can be met.

42.3.6. This Section does not apply to cranes designed for use on railroad tracks when used on railroad tracks that are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR Part 213 and that comply with applicable Federal Railroad Administration requirements.

42.4. Assembly/disassembly. Selection of manufacturer or employer procedures.

42.4.1. When assembling or disassembling equipment (or attachments), the employer must comply with all applicable manufacturer prohibitions and must comply with either:

42.4.1.a. Manufacturer procedures applicable to assembly and disassembly, or

42.4.1.b. Employer procedures for assembly and disassembly. Employer procedures may be used only where the employer can demonstrate that the procedures used meet the requirements in §36-23-42.7. Note: The employer must follow manufacturer procedures when an employer uses synthetic slings during assembly or disassembly rigging. (See §36-23-42.5.15.)

42.5. Assembly/disassembly. General requirements (applies to all assembly and disassembly operations.

42.5.1. Supervision. Competent-qualified person.

42.5.1.a. Assembly/disassembly must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons ("A/D director").

42.5.1.b. Where the assembly/disassembly is being performed by only one person, that person must meet the criteria for both a competent person and a qualified person. For purposes of this standard, that person is considered the A/D director.

42.5.2. Knowledge of procedures. The A/D director must understand the applicable assembly/disassembly procedures.

42.5.3. Review of procedures. The A/D director must review the applicable assembly/disassembly procedures immediately prior to the commencement of assembly/disassembly unless the A/D director understands the procedures and has applied them to the same type and configuration of equipment (including accessories, if any).

42.5.4. Crew instructions.

42.5.4.a. Before commencing assembly/disassembly operations, the A/D director must ensure that the crew members understand all of the following:

42.5.4.a.1. Their tasks.

42.5.4.a.2. The hazards associated with their tasks.

42.5.4.a.3. The hazardous positions/locations that they need to avoid.

42.5.4.b. During assembly/disassembly operations, before a crew member takes on a different task, or when adding new personnel during the operations, the requirements in §§36-23-42.5.4.a.1. through 36-23-42.5.4.a.3. must be met.

42.5.5. Protecting assembly/disassembly crew members out of operator view.

42.5.5.a. Before a crew member goes to a location that is out of view of the operator and is either in, on, or under the equipment, or near the equipment (or load) where the crew member could be injured by movement of the equipment (or load), the crew member must inform the operator that he/she is going to that location.

42.5.5.b. Where the operator knows that a crew member went to a location covered by §36-23-42.5.5.a., the operator must not move any part of the equipment (or load) until the operator is informed in accordance with a pre-arranged system of communication that the crew member is in a safe position.

42.5.6. Working under the boom, jib or other components.

42.5.6.a. When pins (or similar devices) are being removed, employees must not be under the boom, jib, or other components, except where the requirements of §36-23-42.5.5.b. are met.

42.5.6.b. Exception. Where the employer demonstrates that site constraints require one (1) or more employees to be under the boom, jib, or other components when pins (or similar devices) are being removed, the A/D director must implement procedures that minimize the risk of unintended dangerous movement and minimize the duration and extent of exposure under the boom.

42.5.7. Capacity limits. During all phases of assembly/disassembly, rated capacity limits for loads imposed on the equipment, equipment components (including rigging), lifting lugs and equipment

accessories, must not be exceeded for the equipment being assembled/disassembled.

42.5.8. Addressing specific hazards. The A/D director supervising the assembly/disassembly operation must address the hazards associated with the operation, which include:

42.5.8.a. Site and ground bearing conditions. Site and ground conditions must be adequate for safe assembly/disassembly operations and to support the equipment during assembly/disassembly (see §36-23-42.3. for ground condition requirements).

42.5.8.b. Blocking material. The size, amount, condition and method of stacking the blocking must be sufficient to sustain the loads and maintain stability.

42.5.8.c. Proper location of blocking. When used to support lattice booms or components, blocking must be appropriately placed to:

42.5.8.c.1. Protect the structural integrity of the equipment, and

42.5.8.c.2. Prevent dangerous movement and collapse.

42.5.8.d. Verifying assist crane loads. When using an assist crane, the loads that will be imposed on the assist crane at each phase of assembly/disassembly must be verified in accordance with §36-23-42.18.13.c. before assembly/disassembly begins.

42.5.8.e. Boom and jib pick points. The point(s) of attachment of rigging to a boom (or boom sections or jib or jib sections) must be suitable for preventing structural damage and facilitating safe handling of these components.

42.5.8.f. Center of gravity.

42.5.8.f.1. The center of gravity of the load must be identified if that is necessary for the method used for maintaining stability.

42.5.8.f.2. Where there is insufficient information to accurately identify the center of gravity, measures designed to prevent unintended dangerous movement resulting from an inaccurate identification of the center of gravity must be used.

42.5.8.g. Stability upon pin removal. The boom sections, boom suspension systems (such as gantry A-frames and jib struts), and components must be rigged or supported to maintain stability upon the removal of the pins.

42.5.8.h. Snagging. Suspension ropes and pendants must not be allowed to catch on the boom or jib connection pins or cotter pins (including keepers and locking pins).

42.5.8.i. Struck by counterweights. The potential for unintended movement from inadequately supported counterweights and from hoisting counterweights.

42.5.8.j. Boom hoist brake failure. Each time reliance is to be placed on the boom hoist brake to prevent boom movement during assembly/disassembly, the brake must be tested prior to such reliance to determine if it is sufficient to prevent boom movement. If it is not sufficient, a boom hoist pawl, other locking device/back-up braking device, or another method of preventing dangerous movement of the boom (such as blocking or using an assist crane) from a boom hoist brake failure must be used.

42.5.8.k. Loss of backward stability. Backward stability before swinging the upperworks, travel, and when attaching or removing equipment components.

42.5.8.l. Wind speed and weather. The effect of wind speed and weather on the equipment.

42.5.9. Cantilevered boom sections. Manufacturer limitations on the maximum amount of boom supported only by cantilevering must not be exceeded. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must determine in writing this limitation, which must not be exceeded.

42.5.10. Weight of components. The weight of each of the components must be readily available.

42.5.11. Components and configuration.

42.5.11.a. The selection of components, and configuration of the equipment, that affect the capacity or safe operation of the equipment must be in accordance with:

42.5.11.a.1. Manufacturer instructions, prohibitions, limitations, and specifications. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must approve, in writing, the selection and configuration of components; or

42.5.11.a.2. Approved modifications that meet the requirements of §36-23-42.34. (equipment modifications).

42.5.11.b. Post-assembly inspection. Upon completion of assembly, the equipment must be inspected to ensure compliance with §36-23-42.5.11.a. (see §36-23-42.13.3. for post-assembly inspection requirements).

42.5.12. Shipping pins. Reusable shipping pins, straps, links, and similar equipment must be removed. Once they are removed they must either be stowed or otherwise stored so that they do not present a falling object hazard.

42.5.13. Pile driving. Equipment used for pile driving must not have a jib attached during pile driving operations.

42.5.14. Outriggers and Stabilizers. When the load to be handled and the operating radius require the use of outriggers or stabilizers, or at any time when outriggers or stabilizers are used, all of the following requirements must be met (except as otherwise indicated):

42.5.14.a. The outriggers or stabilizers must be either fully extended or, if manufacturer procedures permit, deployed as specified in the load chart.

42.5.14.b. The outriggers must be set to remove the equipment weight from the wheels, except for locomotive cranes (see §36-23-42.5.14.f. for use of outriggers on locomotive cranes). This provision does not apply to stabilizers.

42.5.14.c. When outrigger floats are used, they must be attached to the outriggers. When stabilizer floats are used, they must be attached to the stabilizers.

42.5.14.d. Each outrigger or stabilizer must be visible to the operator or to a signal person during extension and setting.

42.5.14.e. Outrigger and stabilizer blocking must:

42.5.14.e.1. Meet the requirements in §§36-23-42.5.8.b. and 36-23-42.5.8.c.

42.5.14.e.2. Be placed only under the outrigger or stabilizer float/pad of the jack or, where the outrigger or stabilizer is designed without a jack, under the outer bearing surface of the extended outrigger or stabilizer beam.

42.5.14.f. For locomotive cranes, when using outriggers or stabilizers to handle loads, the manufacturer's procedures must be followed. When lifting loads without using outriggers or stabilizers, the manufacturer's procedures must be met regarding truck wedges or screws.

42.5.15. Rigging. In addition to following the requirements in 29 §1926.251 and other requirements in this and other standards applicable to rigging, when rigging is used for assembly/disassembly, the employer must ensure that:

42.5.15.a. The rigging work is done by a qualified rigger.

42.5.15.b. Synthetic slings are protected from: Abrasive, sharp or acute edges, and configurations that could cause a reduction of the sling's rated capacity, such as distortion or localized compression. Note: Requirements for the protection of wire rope slings are contained in 29 CFR §1926.251(c)(9).

42.5.15.c. When synthetic slings are used, the synthetic sling manufacturer's instructions, limitations, specifications and recommendations must be followed.

42.6. Disassembly -- additional requirements for dismantling of booms and jibs (applies to both the use of manufacturer procedures and employer procedures):

42.6.1. Dismantling (including dismantling for changing the length of) booms and jibs.

42.6.1.a. None of the pins in the pendants are to be removed (partly or completely) when the pendants are in tension.

42.6.1.b. None of the pins (top or bottom) on boom sections located between the pendant attachment points and the crane/derrick body are to be removed (partly or completely) when the pendants are in tension.

42.6.1.c. None of the pins (top or bottom) on boom sections located between the uppermost boom section and the crane/derrick body are to be removed (partly or completely) when the boom is being supported by the uppermost boom section resting on the ground (or other support).

42.6.1.d. None of the top pins on boom sections located on the cantilevered portion of the boom being removed (the portion being removed ahead of the pendant attachment points) are to be removed (partly or completely) until the cantilevered section to be removed is fully supported.

42.7. Assembly/Disassembly. Employer procedures -- General requirements.

42.7.1. When using employer procedures instead of manufacturer procedures for assembly/disassembly, the employer must ensure that the procedures:

42.7.1.a. Prevent unintended dangerous movement, and prevent collapse, of any part of the equipment.

42.7.1.b. Provide adequate support and stability of all parts of the equipment.

42.7.1.c. Position employees involved in the assembly/disassembly operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized.

42.7.2. Qualified person. Employer procedures must be developed by a qualified person.

42.8. Power line safety (up to 350 kV). Assembly and disassembly.

42.8.1. Before assembling or disassembling equipment, the employer must determine if any part of the equipment, load line, or load (including rigging and lifting accessories) could get, in the direction or area of assembly/disassembly, closer than twenty (20) feet to a power line during the assembly/disassembly process. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3) of this Subsection, as follows:

42.8.1.a. Option (1)-Deenergize and ground. Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.

42.8.1.b. Option (2)-Twenty (20) foot clearance. Ensure that no part of the equipment, load line or load (including rigging and lifting accessories), gets closer than twenty (20) feet to the power line by implementing the measures specified in §36-23-42.8.2.

42.8.1.c. Option (3)-Table 36-23L clearance.

42.8.1.c.1.. Determine the line's voltage and the minimum clearance distance permitted under Table 36-23L (see §36-23-42.9).

42.8.1.c.2. Determine if any part of the equipment, load line, or load (including rigging and lifting accessories), could get closer than the minimum clearance distance to the power line permitted under Table 36-23L (see §36-23-42.9.). If so, then the employer must follow the requirements in §36-23-42.8.2. to ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum clearance distance.

42.8.2. Preventing encroachment/electrocution. Where encroachment precautions are required under Option (2), or Option (3) of this Section, all of the following requirements must be met:

42.8.2.a. Conduct a planning meeting with the Assembly/Disassembly director (A/D director), operator, assembly/disassembly crew and the other workers who will be in the assembly/disassembly area to review the location of the power line(s) and the steps that will be implemented to prevent encroachment/electrocution.

42.8.2.b. If tag lines are used, they must be nonconductive.

42.8.2.c. At least one of the following additional measures must be in place. The measure selected from this list must be effective in preventing encroachment.

42.8.2.c.1. Use a dedicated spotter who is in continuous contact with the equipment operator. The dedicated spotter must:

42.8.2.c.1.A. Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: A clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).

42.8.2.c.1.B. Be positioned to effectively gauge the clearance distance.

42.8.2.c.1.C. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

42.8.2.c.1.D. Give timely information to the operator so that the required clearance distance can be maintained.

42.8.2.c.2. A proximity alarm set to give the operator sufficient warning to prevent encroachment.

42.8.2.c.3. A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

42.8.2.c.4. A device that automatically limits range of movement, set to prevent encroachment.

42.8.2.c.5. An elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings.

42.8.3. Assembly/disassembly below power lines prohibited. No part of a crane/derrick, load line, or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.

42.8.4. Assembly/disassembly inside Table 36-23L (clearance prohibited). No part of a crane/derrick, load line, or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed closer than the minimum approach distance under Table 36-23L (see §36-23-42.9.) to a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.

42.8.5. Voltage information. Where Option (3) of this Section is used, the utility owner/operator of the power lines must provide the requested voltage information within two (2) working days of the employer's request.

42.8.6. Power lines presumed energized. The employer must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.

42.8.7. Posting of electrocution warnings. There must be at least one (1) electrocution hazard warning conspicuously posted in the cab so that it is in view of the operator and (except for overhead gantry and tower cranes) at least two (2) on the outside of the equipment.

42.9. Power line safety (up to 350 kV). Equipment operations.

42.9.1. Hazard assessments and precautions inside the work zone. Before beginning equipment operations, the employer must:

42.9.1.a. Identify the work zone by either:

42.9.1.a.1. Demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the equipment past those boundaries, or

42.9.1.a.2. Defining the work zone as the area three hundred sixty (360) degrees around the equipment, up to the equipment's maximum working radius.

42.9.1.b. Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than twenty (20) feet to a power line. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3) of this Section, as follows:

42.9.1.b.1. Option (1)-Deenergize and ground. Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.

42.9.1.b.2. Option (2)-Twenty (20) foot clearance. Ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than twenty (20) feet to the power line by implementing the measures specified in §36-23-42.9.2.

42.9.1.b.3. Option (3)-Table 36-23L clearance.

42.9.1.b.3.A. Determine the line's voltage and the minimum approach distance permitted under Table A (see §36-23-42.9.)

42.9.1.b.3.B. Determine if any part of the equipment, load line or load (including rigging and lifting accessories), while operating up to the equipment's maximum working radius in the work zone, could get closer than the minimum approach distance of the power line permitted under Table 36-23L (see §36-23-43.9.). If so, then the employer must follow the requirements in §36-23-42.9.2. to ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum approach distance.

42.9.2. Preventing encroachment/electrocution. Where encroachment precautions are required under Option (2) or Option (3) of this Section, all of the following requirements must be met:

42.9.2.a. Conduct a planning meeting with the operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.

42.9.2.b. If tag lines are used, they must be non-conductive.

42.9.2.c. Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at twenty (20) feet from the power line (if using Option (2) of this Section) or at the minimum approach distance under Table 36-23L (see §36-23-42.9.) (if using Option (3) of this Section). If the operator is unable to see the elevated warning line, a dedicated spotter must be used as described in §36-23-42.9.2.d.2. in addition to implementing one of the measures described in §§36-23-42.9.2.d.1, 36-23-42.9.2.d.3, 36-23-42.9.2.d.4, and 36-23-42.9.2.d.5.

42.9.2.d. Implement at least one of the following measures:

42.9.2.d.1. A proximity alarm set to give the operator sufficient warning to prevent encroachment.

42.9.2.d.2. A dedicated spotter who is in continuous contact with the operator. Where this measure is selected, the dedicated spotter must:

42.9.2.d.2.A. Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: A clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).

42.9.2.d.2.B. Be positioned to effectively gauge the clearance distance.

42.9.2.d.2.C. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

42.9.2.d.2.D. Give timely information to the operator so that the required clearance distance can be maintained.

42.9.2.d.3. A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

42.9.2.d.4. A device that automatically limits range of movement, set to prevent encroachment.

42.9.2.d.5. An insulating link/device, as defined in §36-23-42.1.5., installed at a point between the end of the load line (or below) and the load.

42.9.2.e. The requirements of §36-23-42.9.2.d. do not apply to work covered by OSHA §1926 (Electric Power Transmission and Distribution).

42.9.3. Voltage information. Where Option (3) of this Section is used, the utility owner/operator of the power lines must provide the requested voltage information within two (2) working days of the employer's request.

42.9.4. Operations below power lines.

42.9.4.a. No part of the equipment, load line, or load (including rigging and lifting accessories) is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line, except where one of the exceptions in §36-23-42.9.4.b. applies.

42.9.4.b. Exceptions: §36-23-42.9.4.a. is inapplicable where the employer demonstrates that one (1) of the following applies:

42.9.4.b.1. The work is covered by OSHA §1926 (Electric Power Transmission and Distribution).

42.9.4.b.2. For equipment with non-extensible booms: The uppermost part of the equipment, with the boom at true vertical, would be more than twenty (20) feet below the plane of the power line or more than the Table 36-23L minimum clearance distance below the plane of the power line.

42.9.4.b.3. For equipment with articulating or extensible booms: The uppermost part of the equipment, with the boom in the fully extended position, at true vertical, would be more than twenty (20) feet below the plane of the power line or more than the Table 36-23L minimum clearance distance below the plane of the power line.

42.9.4.b.4. The employer demonstrates that compliance with §36-23-42.9.4.a. is infeasible and meets the requirements of §36-23-42.11.

42.9.5. Power lines presumed energized. The employer must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.

42.9.6. When working near transmitter/communication towers where the equipment is close enough for an electrical charge to be induced in the equipment or materials being handled, the transmitter must be deenergized or the following precautions must be taken:

42.9.6.a. The equipment must be provided with an electrical ground.

42.9.6.b. If tag lines are used, they must be non-conductive.

42.9.7. Training.

42.9.7.a. The employer must train each operator and crew member assigned to work with the equipment on all of the following:

42.9.7.a.1. The procedures to be followed in the event of electrical contact with a power line. Such training must include:

42.9.7.a.1.A. Information regarding the danger of electrocution from the operator simultaneously touching the equipment and the ground.

42.9.7.a.1.B. The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.

42.9.7.a.1.C. The safest means of evacuating from equipment that may be energized.

42.9.7.a.1.D. The danger of the potentially energized zone around the equipment (step potential).

42.9.7.a.1.E. The need for crew in the area to avoid approaching or touching the equipment and the load.

42.9.7.a.1.F. Safe clearance distance from power lines.

42.9.7.a.2. Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the

worksite.

42.9.7.a.3. Power lines are presumed to be uninsulated unless the utility owner/operator or a registered engineer who is a qualified person with respect to electrical power transmission and distribution confirms that a line is insulated.

42.9.7.a.4. The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.

42.9.7.a.5. The procedures to be followed to properly ground equipment and the limitations of grounding.

42.9.7.b. Employees working as dedicated spotters must be trained to enable them to effectively perform their task, including training on the applicable requirements of this Section.

42.9.7.c. Training under this Section must be administered in accordance with §36-23-42.2.

42.9.8. Devices originally designed by the manufacturer for use as: A safety device (see §36-23-42.6.), operational aid, or a means to prevent power line contact or electrocution, when used to comply with this Section, must meet the manufacturer's procedures for use and conditions of use.

TABLE 36-23L -- Minimum Clearance Distances

<u>Voltage</u> <u>(nominal, kV, alternating current)</u>	<u>Minimum clearance distance</u> <u>(feet)</u>
<u>up to 50</u>	<u>10</u>
<u>over 50 to 200*</u>	<u>15</u>
<u>over 200 to 350*</u>	<u>20</u>
<u>over 350 to 500*</u>	<u>25</u>
<u>over 500 to 750*</u>	<u>35</u>
<u>over 750 to 1,000*</u>	<u>45</u>
<u>over 1,000*</u>	<u>(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)</u>

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

\*At voltages greater than 136 kV, the operator shall contact and coordinate with the utility owner/operator.

42.10. Power line safety over 350 kV.

42.10.1. The requirements of §§36-23-42.8. and 36-23-42.9. apply to power lines over 350 kV except:

42.10.1.a. For power lines at or below one thousand (1000) kV, wherever the distance "twenty (20) feet" is specified, the distance "fifty (50) feet" must be substituted; and

42.10.1.b. For power lines over one thousand (1000) kV, the minimum clearance distance

must be established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.

42.11. Power line safety (all voltages). Equipment operations closer than the Table 36-23L zone.

42.11.1. Equipment operations in which any part of the equipment, load line, or load (including rigging and lifting accessories) is closer than the minimum approach distance under Table 36-23L of §36-23-42.9. to an energized power line is prohibited, except where the employer demonstrates that all of the following requirements are met:

42.11.1.a. The employer determines that it is infeasible to do the work without breaching the minimum approach distance under Table 36-23L of §36-23-42.9.

42.11.1.b. The employer determines that, after consultation with the utility owner/operator, it is infeasible to deenergize and ground the power line or relocate the power line.

42.11.1.c. Minimum clearance distance.

42.11.1.c.1. The power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution determines the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions. The factors that must be considered in making this determination include, but are not limited to: Conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line, and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.

42.11.1.c.2. Paragraph 36-23-42.11.1.c.1. does not apply to work covered by Subpart V of OSHA §1926 (Electric Power Transmission and Distribution); instead, for such work, the minimum approach distances established by the employer under OSHA §1926.960(c)(1)(i) apply.

42.11.1.d. A planning meeting with the employer and utility owner/operator (or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution) is held to determine the procedures that will be followed to prevent electrical contact and electrocution. At a minimum these procedures must include:

42.11.1.d.1. If the power line is equipped with a device that automatically reenergizes the circuit in the event of a power line contact, before the work begins, the automatic reclosing feature of the circuit interrupting device must be made inoperative if the design of the device permits.

42.11.1.d.2. A dedicated spotter who is in continuous contact with the operator. The dedicated spotter must:

42.11.1.d.2.A. Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: A line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).

42.11.1.d.2.B. Be positioned to effectively gauge the clearance distance.

42.11.1.d.2.C. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

42.11.1.d.2.D. Give timely information to the operator so that the required clearance distance can be maintained.

42.11.1.d.3. An elevated warning line, or barricade (not attached to the crane), in view of the operator (either directly or through video equipment), equipped with flags or similar high-visibility markings, to prevent electrical contact. However, this provision does not apply to work covered by Subpart V of OSHA §1926 (Electric Power Transmission and Distribution).

42.11.1.d.4. Insulating link/device.

42.11.1.d.4.A. An insulating link/device installed at a point between the end of the load line (or below) and the load.

42.11.1.d.4.B. Subparagraph 36-23-42.11.1.d.4.A. does not apply to work covered by Subpart V of OSHA §1926 (Electric Power Transmission Distribution).

42.11.1.d.5. Nonconductive rigging if the rigging may be within the Table 36-23L of §36-23-42.9. distance during the operation.

42.11.1.d.6. If the equipment is equipped with a device that automatically limits range of movement, it must be used and set to prevent any part of the equipment, load line, or load (including rigging and lifting accessories) from breaching the minimum approach distance established under §36-23-42.11.1.c.

42.11.1.d.7. If a tag line is used, it must be of the nonconductive type.

42.11.1.d.8. Barricades forming a perimeter at least ten (10) feet away from the equipment to prevent unauthorized personnel from entering the work area. In areas where obstacles prevent the barricade from being at least ten (10) feet away, the barricade must be as far from the equipment as feasible.

42.11.1.d.9. Workers other than the operator must be prohibited from touching the load line above the insulating link/device and crane. Operators remotely operating the equipment from the ground must use either wireless controls that isolate the operator from the equipment or insulating mats that insulate the operator from the ground.

42.11.1.d.10. Only personnel essential to the operation are permitted to be in the area of the crane and load.

42.11.1.d.11. The equipment must be properly grounded.

42.11.1.d.12. Insulating line hose or cover-up must be installed by the utility owner/operator except where such devices are unavailable for the line voltages involved.

42.11.1.e. The procedures developed to comply with §36-23-42.11.1.d. are documented and immediately available on-site.

42.11.1.f. The equipment user and utility owner/operator (or registered professional engineer) meet with the equipment operator and the other workers who will be in the area of the equipment or load to review the procedures that will be implemented to prevent breaching the minimum approach distance established in §36-23-42.11.1.c. and prevent electrocution.

42.11.1.g. The procedures developed to comply with §36-23-42.11.1.d. of this Subsection are implemented.

42.11.1.h. The utility owner/operator (or registered professional engineer) and all employers of employees involved in the work must identify one person who will direct the implementation of the procedures. The person identified in accordance with this Subdivision must direct the implementation of the procedures and must have the authority to stop work at any time to ensure safety.

42.11.1.i. If a problem occurs implementing the procedures being used to comply with §36-23-42.11.1.d., or indicating that those procedures are inadequate to prevent electrocution, the employer must safely stop operations and either develop new procedures to comply with §36-23-42.11.1.d. or have the utility owner/operator deenergize and visibly ground or relocate the power line before resuming work.

42.11.1.i. Devices originally designed by the manufacturer for use as a safety device (see §36-23-42.16.), operational aid, or a means to prevent power line contact or electrocution, when used to comply with this Section, must comply with the manufacturer's procedures for use and conditions of use.

42.11.1.k. The employer must train each operator and crew member assigned to work with the equipment in accordance with §36-23-42.9.7.

#### 42.12. Power line safety while traveling under or near power lines with no load.

42.12.1. This Section establishes procedures and criteria that must be met for equipment traveling under or near a power line on a construction site with no load. Equipment traveling on a construction site with a load is governed by §§36-23-42.9., 36-23-42.10., or 36-23-42.11., whichever is appropriate, and §36-23-42.18.19.

#### 42.12.2. The employer must ensure that:

42.12.2.a. The boom/mast and boom/mast support system are lowered sufficiently to meet the requirements of this Section.

42.12.2.b. The clearances specified in Table 36-23M are maintained.

42.12.2.c. The effects of speed and terrain on equipment movement (including movement of the boom/mast) are considered so that those effects do not cause the minimum clearance distances specified in Table 36-23M to be breached.

42.12.2.d. Dedicated spotter. If any part of the equipment while traveling will get closer than twenty (20) feet to the power line, the employer must ensure that a dedicated spotter who is in continuous contact with the driver/operator is used. The dedicated spotter must:

42.12.2.d.1. Be positioned to effectively gauge the clearance distance.

42.12.2.d.2. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

42.12.2.d.3. Give timely information to the operator so that the required clearance distance can be maintained.

42.12.2.e. Additional precautions for traveling in poor visibility. When traveling at night, or in

conditions of poor visibility, in addition to the measures specified in §§36-23-43.12.2.a. through 36-23-42.12.2.d., the employer must ensure that:

42.12.2.e.1. The power lines are illuminated or another means of identifying the location of the lines is used.

42.12.2.e.2. A safe path of travel is identified and used.

Table 36-23M -- Minimum Clearance Distances While Traveling With No Load

<u>Voltage</u> <u>(nominal, kV, alternating current)</u>	<u>While Traveling -- Minimum clearance distance</u> <u>(feet)</u>
<u>up to .75</u>	<u>4</u>
<u>over .75 to 50</u>	<u>6</u>
<u>over 50 to 345</u>	<u>10</u>
<u>over 345 to 750</u>	<u>16</u>
<u>over 750 to 1,000</u>	<u>20</u>
<u>over 1,000</u>	<u>(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)</u>

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

#### 42.13. Inspections.

##### 42.13.1. Modified equipment.

42.13.1.a. Equipment that has had modifications or additions which affect the safe operation of the equipment (such as modifications or additions involving a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) or capacity must be inspected by a qualified person after such modifications/additions have been completed, prior to initial use. The inspection must meet all of the following requirements:

42.13.1.a.1. The inspection must assure that the modifications or additions have been done in accordance with the approval obtained pursuant to §36-23-42.34. (equipment modifications).

42.13.1.a.2. The inspection must include functional testing of the equipment.

42.13.1.b. Equipment must not be used until an inspection under this Paragraph demonstrates that the requirements of §36-23-42.13.a.1. have been met.

##### 42.13.2. Repaired/adjusted equipment.

42.13.2.a. Equipment that has had a repair or adjustment that relates to safe operation (such as: A repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism), must be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use. The inspection must meet all of the following requirements:

42.13.2.a.1. The qualified person must determine if the repair/adjustment meets manufacturer equipment criteria (where applicable and available).

42.13.2.a.2. Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person must:

42.13.2.a.2.A. Determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.

42.13.2.a.2.B. Determine if the repair/adjustment meets the criteria developed in accordance with §36-23-42.13.1.a.2.A.

42.13.2.a.3. The inspection must include functional testing of the repaired/adjusted parts and other components that may be affected by the repair/adjustment.

42.13.2.b. Equipment must not be used until an inspection under this Section demonstrates that the repair/adjustment meets the requirements of §36-23-42.13.1.a.1. (or, where applicable, §36-23-42.13.1.a.2.).

#### 42.13.3. Post-assembly.

42.13.3.a. Upon completion of assembly, the equipment must be inspected by a qualified person to assure that it is configured in accordance with manufacturer equipment criteria.

42.13.3.b. Where manufacturer equipment criteria are unavailable, a qualified person must:

42.13.3.b.1. Determine if a registered professional engineer (RPE) familiar with the type of equipment involved is needed to develop criteria for the equipment configuration. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.

42.13.3.b.2. Determine if the equipment meets the criteria developed in accordance with §36-23-42.13.3.b.1.

42.13.3.c. Equipment must not be used until an inspection under this Subsection demonstrates that the equipment is configured in accordance with the applicable criteria.

#### 42.13.4. Each shift.

42.13.4.a. A competent person must begin a visual inspection prior to each shift the equipment will be used, which must be completed before or during that shift. The inspection must consist of observation for apparent deficiencies. Taking apart equipment components and booming down is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart equipment components or booming down is needed. Determinations made in conducting the inspection must be reassessed in light of observations made during operation. At a minimum the inspection must include all of the following:

42.13.4.a.1. Control mechanisms for maladjustments interfering with proper operation.

42.13.4.a.2. Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.

42.13.4.a.3. Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.

42.13.4.a.4. Hydraulic system for proper fluid level.

42.13.4.a.5. Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.

42.13.4.a.6. Wire rope reeving for compliance with the manufacturer's specifications.

42.13.4.a.7. Wire rope, in accordance with §36-23-42.14.1.

42.13.4.a.8. Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.

42.13.4.a.9. Tires (when in use) for proper inflation and condition.

42.13.4.a.10. Ground conditions around the equipment for proper support, including ground settling under and around outriggers/stabilizers and supporting foundations, ground water accumulation, or similar conditions. This Paragraph does not apply to the inspection of ground conditions for railroad tracks and their underlying support when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR Part 213.

42.13.4.a.11. The equipment for level position within the tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.

42.13.4.a.12. Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.

42.13.4.a.13. Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling. This Paragraph does not apply to the inspection of rails, rail stops, rail clamps and supporting surfaces when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under 49 CFR Part 213.

42.13.4.a.14. Safety devices and operational aids for proper operation.

42.13.4.b. If any deficiency in §§36-23-42.13.4.a.1. through 36-23-42.13.4.a.13. (or in additional inspection items required to be checked for specific types of equipment in accordance with other sections of this standard) is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, the equipment must be taken out of service until it has been corrected.

42.13.4.c. If any deficiency in §36-23-42.13.4.a.14. (safety devices/operational aids) is identified, the action specified in §§36-23-42.16. and 36-23-42.17. must be taken prior to using the equipment.

42.13.5. Monthly.

42.13.5.a. Each month the equipment is in service it must be inspected in accordance with §36-23-42.13.4. (each shift).

42.13.5.b. Equipment must not be used until an inspection under this Subdivision demonstrates that no corrective action under §§36-23-42.13.4.b. and 36-23-42.13.4.c. is required.

42.13.5.c. Documentation.

42.13.5.c.1. The following information must be documented and maintained by the employer that conducts the inspection:

42.13.5.c.1.A. The items checked and the results of the inspection.

42.13.5.c.1.B. The name and signature of the person who conducted the inspection and the date.

42.13.5.c.1.C. This document must be retained for a minimum of twelve (12) months and be made available for inspection by interested persons.

42.13.6. Annual/comprehensive.

42.13.6.a. At least every twelve (12) months the equipment must be inspected by a qualified person in accordance with Subsection 36-23-42.13.4. (each shift) except that the corrective action set forth in §§36-23-42.13.6.d., 36-23-42.13.6.e., and 36-23-42.23.13.6.f. must apply in place of the corrective action required by §§36-23-42.13.4.b. and 36-23-42.13.4.c.

42.13.6.b. In addition, at least every twelve (12) months, the equipment must be inspected by a qualified person. Disassembly is required, as necessary, to complete the inspection. The equipment must be inspected for all of the following:

42.13.6.b.1. Equipment structure (including the boom and, if equipped, the jib):

42.13.6.b.1.A. Structural members: Deformed, cracked, or significantly corroded.

42.13.6.b.1.B. Bolts, rivets and other fasteners: loose, failed or significantly corroded.

42.13.6.b.1.C. Welds for cracks.

42.13.6.b.2. Sheaves and drums for cracks or significant wear.

42.13.6.b.3. Parts such as pins, bearings, shafts, gears, rollers and locking devices for distortion, cracks or significant wear.

42.13.6.b.4. Brake and clutch system parts, linings, pawls and ratchets for excessive wear.

42.13.6.b.5. Safety devices and operational aids for proper operation (including significant inaccuracies).

42.13.6.b.6. Gasoline, diesel, electric, or other power plants for safety-related problems (such as leaking exhaust and emergency shut-down feature) and conditions, and proper operation.

42.13.6.b.7. Chains and chain drive sprockets for excessive wear of sprockets and excessive chain stretch.

42.13.6.b.8. Travel steering, brakes, and locking devices, for proper operation.

42.13.6.b.9. Tires for damage or excessive wear.

42.13.6.b.10. Hydraulic, pneumatic and other pressurized hoses, fittings and tubing, as follows:

42.13.6.b.10.A. Flexible hose or its junction with the fittings for indications of leaks.

42.13.6.b.10.B. Threaded or clamped joints for leaks.

42.13.6.b.10.C. Outer covering of the hose for blistering, abnormal deformation or other signs of failure/impending failure.

42.13.6.b.10.D. Outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing.

42.13.6.b.11. Hydraulic and pneumatic pumps and motors, as follows:

42.13.6.b.11.A. Performance indicators: Unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure.

42.13.6.b.11.B. Loose bolts or fasteners.

42.13.6.b.11.C. Shaft seals and joints between pump sections for leaks.

42.13.6.b.12. Hydraulic and pneumatic valves, as follows:

42.13.6.b.12.A. Spools: Sticking, improper return to neutral, and leaks.

42.13.6.b.12.B. Leaks.

42.13.6.b.12.C. Valve housing cracks.

42.13.6.b.12.D. Relief valves: Failure to reach correct pressure (if there is a manufacturer procedure for checking pressure, it must be followed).

42.13.6.b.13. Hydraulic and pneumatic cylinders, as follows:

42.13.6.b.13.A. Drifting caused by fluid leaking across the piston.

42.13.6.b.13.B. Rod seals and welded joints for leaks.

42.13.6.b.13.C. Cylinder rods for scores, nicks, or dents.

42.13.6.b.13.D. Case (barrel) for significant dents.

42.13.6.b.13.E. Rod eyes and connecting joints: Loose or deformed.

42.13.6.b.14. Outrigger or stabilizer pads/floats for excessive wear or cracks.

42.13.6.b.15. Slider pads for excessive wear or cracks.

42.13.6.b.16. Electrical components and wiring for cracked or split insulation and loose or corroded terminations.

42.13.6.b.17. Warning labels and decals originally supplied with the equipment by the manufacturer or otherwise required under this standard: Missing or unreadable.

42.13.6.b.18. Originally equipped operator seat (or equivalent): Missing.

42.13.6.b.19. Operator seat: Unserviceable.

42.13.6.b.20. Originally equipped steps, ladders, handrails, guards: Missing.

42.13.6.b.21. Steps, ladders, handrails, guards: In unusable/unsafe condition.

42.13.6.c. This inspection must include functional testing to determine that the equipment as configured in the inspection is functioning properly.

42.13.6.d. If any deficiency is identified, an immediate determination must be made by the qualified person as to whether the deficiency constitutes a safety hazard or, though not yet a safety hazard, needs to be monitored in the monthly inspections.

42.13.6.e. If the qualified person determines that a deficiency is a safety hazard, the equipment must be taken out of service until it has been corrected, except when temporary alternative measures are implemented as specified in §36-23-42.17.4. or §36-23-42.35.5. (See §36-23-42.18.)

42.13.6.f. If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.

42.13.6.g. Documentation of annual/comprehensive inspection. The following information must be documented, maintained, and retained for a minimum of twelve (12) months, by the employer that conducts the inspection and be made available for inspection by interested persons:

42.13.6.g.1. The items checked and the results of the inspection.

42.13.6.g.2. The name and signature of the person who conducted the inspection and the date.

42.13.7. Severe service. Where the severity of use/conditions is such that there is a reasonable probability of damage or excessive wear (such as loading that may have exceeded rated capacity, shock loading that may have exceeded rated capacity, prolonged exposure to a corrosive atmosphere), the employer must stop using the equipment and a qualified person must:

42.13.7.a. Inspect the equipment for structural damage to determine if the equipment can continue to be used safely.

42.13.7.b. In light of the use/conditions determine whether any items/conditions listed in

§36-23-42.13.6. need to be inspected; if so, the qualified person must inspect those items/conditions.

42.13.7.c. If a deficiency is found, the employer must follow the requirements in §§36-23-42.13.6.d. through 36-23-42.6.f.

42.13.8. Equipment not in regular use. Equipment that has been idle for three (3) months or more must be inspected by a qualified person in accordance with the requirements of §36-23-42.13.5. (monthly) before initial use.

42.13.9. Any part of a manufacturer's procedures regarding inspections that relate to safe operation (such as to a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) that is more comprehensive or has a more frequent schedule of inspection than the requirements of this Section must be followed.

42.13.10. All documents produced under this Section must be available, during the applicable document retention period, to all persons who conduct inspections under this Section and by other interested persons.

#### 42.14. Wire rope. Inspection.

##### 42.14.1. Shift inspection.

42.14.1.a. A competent person must begin a visual inspection prior to each shift the equipment is used, which must be completed before or during that shift. The inspection must consist of observation of wire ropes (running and standing) that are likely to be in use during the shift for apparent deficiencies, including those listed in §36-23-42.14.1.b. Untwisting (opening) of wire rope or booming down is not required as part of this inspection.

##### 42.14.1.b. Apparent deficiencies.

###### 42.14.1.b.1. Category I. Apparent deficiencies in this category include the following:

42.14.1.b.1.A. Significant distortion of the wire rope structure such as kinking, crushing, unstranding, birdcaging, signs of core failure or steel core protrusion between the outer strands.

42.14.1.b.1.B. Significant corrosion.

42.14.1.b.1.C. Significantly corroded, cracked, bent, or worn end connections (such as from severe service).

42.14.1.b.1.D. Electric arc damage (from a source other than power lines) or heat damage.

42.14.1.b.1.E. Improperly applied end connections.

###### 42.14.1.b.2. Category II. Apparent deficiencies in this category are:

###### 42.14.1.b.2.A. Visible broken wires, as follows:

42.14.1.b.2.A.1. In running wire ropes: Six (6) randomly distributed broken wires

in one (1) rope lay or three (3) broken wires in one (1) strand in one (1) rope lay, where a rope lay is the length along the rope in which one (1) strand makes a complete revolution around the rope.

42.14.1.b.2.A.2. In rotation resistant ropes: Two (2) randomly distributed broken wires in six (6) rope diameters or four (4) randomly distributed broken wires in thirty (30) rope diameters.

42.14.1.b.2.A.3. In pendants or standing wire ropes: More than two (2) broken wires in one (1) rope lay located in rope beyond end connections and/or more than one (1) broken wire in a rope lay located at an end connection.

42.14.1.b.2.B. A diameter reduction of more than five (5) percent from nominal diameter.

42.14.1.b.3. Category III. Apparent deficiencies in this category include the following:

42.14.1.b.3.A. In rotation resistant wire rope, core protrusion or other distortion indicating core failure.

42.14.1.b.3.B. Prior electrical contact with a power line.

42.14.1.b.3.C. A broken strand.

42.14.1.c. Critical review items. The competent person must give particular attention to all of the following:

42.14.1.c.1. Rotation resistant wire rope in use.

42.14.1.c.2. Wire rope being used for boom hoists and luffing hoists, particularly at reverse bends.

42.14.1.c.3. Wire rope at flange points, crossover points and repetitive pickup points on drums.

42.14.1.c.4. Wire rope at or near terminal ends.

42.14.1.c.5. Wire rope in contact with saddles, equalizer sheaves or other sheaves where rope travel is limited.

42.14.1.d. Removal from service.

42.14.1.d.1. If a deficiency in Category I (see §36-23-42.14.1.b.1.) is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:

42.14.1.d.1.A. The wire rope is replaced (see §36-23-42.18. (operation)), or

42.14.1.d.1.B. If the deficiency is localized, the problem is corrected by severing the wire rope; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this Subparagraph, the employer must ensure that the drum will still have two (2) wraps of wire when the load and/or boom is in its lowest position.

42.14.1.d.2. If a deficiency in Category II (see §36-23-42.14.1.b.2.) is identified, operations involving use of the wire rope in question must be prohibited until:

42.14.1.d.2.A. The employer complies with the wire rope manufacturer's established criterion for removal from service or a different criterion that the wire rope manufacturer has approved in writing for that specific wire rope (see §36-23-42.18. (operation)),

42.14.1.d.2.B. The wire rope is replaced (see §§36-23-42.18. (operation)), or

42.14.1.d.2.C. If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this Subparagraph, the employer must ensure that the drum will still have two (2) wraps of wire when the load and/or boom is in its lowest position.

42.14.1.d.3. If a deficiency in Category III is identified, operations involving use of the wire rope in question must be prohibited until:

42.14.1.d.3.A. The wire rope is replaced (see §36-23-42.18. (operation)), or

42.14.1.d.3.B. If the deficiency (other than power line contact) is localized, the problem is corrected by severing the wire rope; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. Repair of wire rope that contacted an energized power line is also prohibited. If a rope is shortened under this Subparagraph, the employer must ensure that the drum will still have two (2) wraps of wire when the load and/or boom is in its lowest position.

42.14.1.d.4. Where a wire rope is required to be removed from service under this Section, either the equipment (as a whole) or the hoist with that wire rope must be tagged-out, in accordance with §36-23-42.18.6.a., until the wire rope is repaired or replaced.

#### 42.14.2. Monthly inspection.

42.14.2.a. Each month an inspection must be conducted in accordance with §36-23-42.14.1. (shift inspection).

42.14.2.b. The inspection must include any deficiencies that the qualified person who conducts the annual inspection determines under §36-23-42.14.3.c.2. must be monitored.

42.14.2.c. Wire ropes on equipment must not be used until an inspection under this Subdivision demonstrates that no corrective action under §36-23-42.14.1.d. is required.

42.14.2.d. The inspection must be documented according to §36-23-42.13.5.c. (monthly inspection documentation).

#### 42.14.3. Annual/comprehensive.

42.14.3.a. At least every twelve (12) months, wire ropes in use on equipment must be inspected by a qualified person in accordance with §36-23-42.14.1. (shift inspection).

42.14.3.b. In addition, at least every twelve (12) months, the wire ropes in use on equipment must be inspected by a qualified person, as follows:

42.14.3.b.1. The inspection must be for deficiencies of the types listed in §36-23-42.14.1.b.

42.14.3.b.2. The inspection must be complete and thorough, covering the surface of the entire length of the wire ropes, with particular attention given to all of the following:

42.14.3.b.2.A. Critical review items listed in §36-23-42.14.1.c.

42.14.3.b.2.B. Those sections that are normally hidden during shift and monthly inspections.

42.14.3.b.2.C. Wire rope subject to reverse bends.

42.14.3.b.2.D. Wire rope passing over sheaves.

42.14.3.b.3. Exception: In the event an inspection under §36-23-42.14.3.b. is not feasible due to existing set-up and configuration of the equipment (such as where an assist crane is needed) or due to site conditions (such as a dense urban setting), such inspections must be conducted as soon as it becomes feasible, but no longer than an additional six (6) months for running ropes and, for standing ropes, at the time of disassembly.

42.14.3.c. If a deficiency is identified, an immediate determination must be made by the qualified person as to whether the deficiency constitutes a safety hazard.

42.14.3.c.1. If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:

42.14.3.c.1.A. The wire rope is replaced (see §36-23-42.18. (operation)), or

42.14.3.c.1.B. If the deficiency is localized, the problem is corrected by severing the wire rope; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this Subparagraph, the employer must ensure that the drum will still have two (2) wraps of wire when the load and/or boom is in its lowest position.

42.14.3.c.2. If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.

42.14.3.d. The inspection must be documented according to §36-23-42.13.6.g. (annual/comprehensive inspection documentation).

42.14.4. Rope lubricants that are of the type that hinder inspection must not be used.

42.14.5. All documents produced under this Section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

42.15. Wire rope. Selection and installation criteria.

42.15.1. Original equipment wire rope and replacement wire rope must be selected and installed in accordance with the requirements of this Section. Selection of replacement wire rope must be in accordance with the recommendations of the wire rope manufacturer, the equipment manufacturer, or a

qualified person.

42.15.2. Wire rope design criteria: Wire rope (other than rotation resistant rope) must comply with either Option (1) or Option (2) of this Subsection, as follows:

42.15.2.a. Option (1). Wire rope must comply with section 5-1.7.1 of ASME B30.5-2004 (incorporated by reference, see OSHA §1926.6) except that section's paragraph (c) must not apply.

42.15.2.b. Option (2). Wire rope must be designed to have, in relation to the equipment's rated capacity, a sufficient minimum breaking force and design factor so that compliance with the applicable inspection provisions in §36-23-42.14. will be an effective means of preventing sudden rope failure.

42.15.3. Wire rope must be compatible with the safe functioning of the equipment.

42.15.4. Boom hoist reeving.

42.15.4.a. Fiber core ropes must not be used for boom hoist reeving, except for derricks.

42.15.4.b. Rotation resistant ropes must be used for boom hoist reeving only where the requirements of §36-23-42.15.5.d.2. are met.

42.15.5. Rotation resistant ropes.

42.15.5.a. Definitions.

42.15.5.a.1. "Type I rotation resistant wire rope" ("Type I"). Type I rotation resistant rope is stranded rope constructed to have little or no tendency to rotate or, if guided, transmits little or no torque. It has at least fifteen (15) outer strands and comprises an assembly of at least three layers of strands laid helically over a center in two (2) operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

42.15.5.a.2. "Type II rotation resistant wire rope" ("Type II"). Type II rotation resistant rope is stranded rope constructed to have significant resistance to rotation. It has at least ten (10) outer strands and comprises an assembly of two (2) or more layers of strands laid helically over a center in two (2) or three (3) operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

42.15.5.a.3. "Type III rotation resistant wire rope" ("Type III"). Type III rotation resistant rope is stranded rope constructed to have limited resistance to rotation. It has no more than nine (9) outer strands, and comprises an assembly of two (2) layers of strands laid helically over a center in two (2) operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

42.15.5.b. Requirements.

42.15.5.b.1. Types II and III with an operating design factor of less than five (5) must not be used for duty cycle or repetitive lifts.

42.15.5.b.2. Rotation resistant ropes (including Types I, II and III) must have an operating design factor of no less than three and one-half (3-1/2).

42.15.5.b.3. Type I must have an operating design factor of no less than five (5), except where the wire rope manufacturer and the equipment manufacturer approve the design factor, in writing.

42.15.5.b.4. Types II and III must have an operating design factor of no less than five (5), except where the requirements of §36-23-42.15.5.c. are met.

42.15.5.c. When Types II and III with an operating design factor of less than five (5) are used (for non-duty cycle, non-repetitive lifts), the following requirements must be met for each lifting operation:

42.15.5.c.1. A qualified person must inspect the rope in accordance with §36-23-42.14.1. The rope must be used only if the qualified person determines that there are no deficiencies constituting a hazard. In making this determination, more than one (1) broken wire in any one rope lay must be considered a hazard.

42.15.5.c.2. Operations must be conducted in such a manner and at such speeds as to minimize dynamic effects.

42.15.5.c.3. Each lift made under §36-23-42.15.5.c. must be recorded in the monthly and annual inspection documents. Such prior uses must be considered by the qualified person in determining whether to use the rope again.

42.15.5.d. Additional requirements for rotation resistant ropes for boom hoist reeving.

42.15.5.d.1. Rotation resistant ropes must not be used for boom hoist reeving, except where the requirements of §36-23-42.15.5.d.2. are met.

42.15.5.d.2. Rotation resistant ropes may be used as boom hoist reeving when load hoists are used as boom hoists for attachments such as luffing attachments or boom and mast attachment systems. Under these conditions, all of the following requirements must be met:

42.15.5.d.2.A. The drum must provide a first layer rope pitch diameter of not less than eighteen (18) times the nominal diameter of the rope used.

42.15.5.d.2.B. The requirements in §36-23-42.27.1. (irrespective of the date of manufacture of the equipment), and §36-23-42.27.2.

42.15.5.d.2.C. The requirements in ASME B30.5-2004 sections 5-1.3.2(a), (a)(2) through (a)(4), (b) and (d) (incorporated by reference, see OSHA §1926.6) except that the minimum pitch diameter for sheaves used in multiple rope reeving is eighteen (18) times the nominal diameter of the rope used (instead of the value of sixteen (16) specified in section 5-1.3.2(d)).

42.15.5.d.2.D. All sheaves used in the boom hoist reeving system must have a rope pitch diameter of not less than eighteen (18) times the nominal diameter of the rope used.

42.15.5.d.2.E. The operating design factor for the boom hoist reeving system must be not less than five (5).

42.15.5.d.2.F. The operating design factor for these ropes must be the total minimum breaking force of all parts of rope in the system divided by the load imposed on the rope system when supporting the static weights of the structure and the load within the equipment's rated capacity.

42.15.5.d.2.G. When provided, a power-controlled lowering system must be capable of handling rated capacities and speeds as specified by the manufacturer.

42.15.6. Wire rope clips used in conjunction with wedge sockets must be attached to the unloaded dead end of the rope only, except that the use of devices specifically designed for dead-ending rope in a wedge socket is permitted.

42.15.7. Socketing must be done in the manner specified by the manufacturer of the wire rope or fitting.

42.15.8. Prior to cutting a wire rope, seizings must be placed on each side of the point to be cut. The length and number of seizings must be in accordance with the wire rope manufacturer's instructions.

#### 42.16. Safety devices.

42.16.1. Safety devices. The following safety devices are required on all equipment covered by this Section, unless otherwise specified:

##### 42.16.1.a. Crane level indicator.

42.16.1.a.1. The equipment must have a crane level indicator that is either built into the equipment or is available on the equipment.

42.16.1.a.2. If a built-in crane level indicator is not working properly, it must be tagged-out or removed. If a removable crane level indicator is not working properly, it must be removed.

42.16.1.a.3. This requirement does not apply to portal cranes, derricks, floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation.

##### 42.16.1.b. Boom stops, except for derricks and hydraulic booms.

##### 42.16.1.c. Jib stops (if a jib is attached), except for derricks.

##### 42.16.1.d. Equipment with foot pedal brakes must have locks.

42.16.1.e. Hydraulic outrigger jacks and hydraulic stabilizer jacks must have an integral holding device/check valve.

##### 42.16.1.f. Equipment on rails must have rail clamps and rail stops, except for portal cranes.

##### 42.16.1.g. Horn.

42.16.1.g.1. The equipment must have a horn that is either built into the equipment or is on the equipment and immediately available to the operator.

42.16.1.g.2. If a built-in horn is not working properly, it must be tagged-out or removed. If a removable horn is not working properly, it must be removed.

42.16.2. Proper operation required. Operations must not begin unless all of the devices listed in this Section are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. If any of the devices listed in this Section are not in proper working

order, the equipment must be taken out of service and operations must not resume until the device is again working properly. (See §36-23-42.18. (Operation)). Alternative measures are not permitted to be used.

#### 42.17. Operational aids.

42.17.1. The devices listed in this Section ("listed operational aids") are required on all equipment covered by this Section, unless otherwise specified.

42.17.1.a. The requirements in §§36-23-42.17.5.a. (boom angle), 36-23-42.17.5.b. (iib angle), and 36-23-42.17.5.c. (boom length) do not apply to articulating cranes.

42.17.1.b. The requirements in §§36-23-42.17.4.c. (anti two-blocking device), 36-23-42.17.5.a. (boom angle), and 36-23-42.17.5.d. (load weighing and similar devices) apply only to those digger derricks manufactured after November 8, 2011.

42.17.2. Operations must not begin unless the listed operational aids are in proper working order, except where an operational aid is being repaired the employer uses the specified temporary alternative measures. The time periods permitted for repairing defective operational aids are specified in §§36-23-42.17.4. (Category I) and 36-23-42.17.5. (Category II). More protective alternative measures specified by the crane/derrick manufacturer, if any, must be followed.

42.17.3. If a listed operational aid stops working properly during operations, the operator must safely stop operations until the temporary alternative measures are implemented or the device is again working properly. If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification under §36-23-42.34. (equipment modifications).

42.17.4. Category I operational aids and alternative measures. Operational aids listed in this Subsection that are not working properly must be repaired no later than seven (7) calendar days after the deficiency occurs. Exception: If the employer documents that it has ordered the necessary parts within seven (7) calendar days of the occurrence of the deficiency, the repair must be completed within seven (7) calendar days of receipt of the parts. (See §36-23-42.18.9. for additional requirements.)

#### 42.17.4.a. Boom hoist limiting device.

42.17.4.a.1. For equipment manufactured after December 16, 1969, a boom hoist limiting device is required. Temporary alternative measures (use at least one). One (1) or more of the following methods must be used:

42.17.4.a.1.A. Use a boom angle indicator.

42.17.4.a.1.B. Clearly mark the boom hoist cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to keep the boom within the minimum allowable radius. In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

42.17.4.a.1.C. Clearly mark the boom hoist cable (so that it can easily be seen by a spotter) at a point that will give the spotter sufficient time to signal the operator and have the operator stop the hoist to keep the boom within the minimum allowable radius.

42.17.4.a.2. If the equipment was manufactured on or before December 16, 1969, and is not equipped with a boom hoist limiting device, at least one (1) of the measures in §§36-23-42.17.4.a.1.A. through 36-23-42.17.4.a.1.C. must be used.

42.17.4.b. Luffing jib limiting device. Equipment with a luffing jib must have a luffing jib limiting device. Temporary alternative measures are the same as in §36-23-42.17.4.a.1., except to limit the movement of the luffing jib rather than the boom hoist.

42.17.4.c. Anti two-blocking device.

42.17.4.c.1. Telescopic boom cranes manufactured after February 28, 1992, must be equipped with a device which automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component). The device(s) must prevent such damage at all points where two-blocking could occur. Temporary alternative measures: Clearly mark the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, and use a spotter when extending the boom.

42.17.4.c.2. Lattice boom cranes.

42.17.4.c.2.A. Lattice boom cranes manufactured after February 28, 1992, must be equipped with a device that either automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component), or warns the operator in time for the operator to prevent two-blocking. The device must prevent such damage/failure or provide adequate warning for all points where two-blocking could occur.

42.17.4.c.2.B. Lattice boom cranes and derricks manufactured after November 8, 2011, must be equipped with a device which automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component). The device(s) must prevent such damage/failure at all points where two-blocking could occur.

42.17.4.c.2.C. Exception. The requirements in §§36-23-42.17.4.c.2.A. and 36-23-42.17.4.c.2.B. do not apply to such lattice boom equipment when used for dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, marine operations that do not involve hoisting personnel, and pile driving work.

42.17.4.c.2.D. Temporary alternative measures. Clearly mark the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or use a spotter.

42.17.4.c.3. Articulating cranes manufactured after December 31, 1999, that are equipped with a load hoist must be equipped with a device that automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component). The device must prevent such damage at all points where two-blocking could occur. Temporary alternative measures: When two-blocking could only occur with movement of the load hoist, clearly mark the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or use a spotter. When two-blocking could occur without movement of the load hoist, clearly mark the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, and use a spotter when extending the boom.

42.17.5. Category II operational aids and alternative measures. Operational aids listed in this Subsection that are not working properly must be repaired no later than thirty (30) calendar days after the deficiency occurs. Exception: If the employer documents that it has ordered the necessary parts within seven (7) calendar days of the occurrence of the deficiency, and the part is not received in time to complete the repair in thirty (30) calendar days, the repair must be completed within seven (7) calendar days of receipt of the parts. (See §36-23-42.18.9. for additional requirements.)

42.17.5.a. Boom angle or radius indicator. The equipment must have a boom angle or radius indicator readable from the operator's station. Temporary alternative measures: Radii or boom angle must be determined by measuring the radii or boom angle with a measuring device.

42.17.5.b. Jib angle indicator if the equipment has a luffing jib. Temporary alternative measures: Radii or jib angle must be determined by ascertaining the main boom angle and then measuring the radii or jib angle with a measuring device.

42.17.5.c. Boom length indicator if the equipment has a telescopic boom, except where the rated capacity is independent of the boom length. Temporary alternative measures. One (1) or more of the following methods must be used:

42.17.5.c.1. Mark the boom with measured marks to calculate boom length,

42.17.5.c.2. Calculate boom length from boom angle and radius measurements,

42.17.5.c.3. Measure the boom with a measuring device.

42.17.5.d. Load weighing and similar devices.

42.17.5.d.1. Equipment (other than derricks and articulating cranes) manufactured after March 29, 2003 with a rated capacity over six thousand (6,000) pounds must have at least one (1) of the following: load weighing device, load moment (or rated capacity) indicator, or load moment (or rated capacity) limiter. Temporary alternative measures: The weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer) or by a calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight). This information must be provided to the operator prior to the lift.

42.17.5.d.2. Articulating cranes manufactured after November 8, 2011, must have at least one (1) of the following: automatic overload prevention device, load weighing device, load moment (or rated capacity) indicator, or load moment (rated capacity) limiter. Temporary alternative measures: The weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer) or by a calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight). This information must be provided to the operator prior to the lift.

42.17.5.e. The following devices are required on equipment manufactured after November 8, 2011:

42.17.5.e.1. Outrigger/stabilizer position (horizontal beam extension) sensor/monitor if the equipment has outriggers or stabilizers. Temporary alternative measures: The operator must verify that the position of the outriggers or stabilizers is correct (in accordance with manufacturer procedures) before beginning operations requiring outrigger or stabilizer deployment.

42.17.5.e.2. Hoist drum rotation indicator if the equipment has a hoist drum not visible from the operator's station. Temporary alternative measures: Mark the drum to indicate the rotation of the drum. In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

#### 42.18. Operation.

42.18.1. The employer must comply with all manufacturer procedures applicable to the operational functions of equipment, including its use with attachments.

#### 42.18.2. Unavailable operation procedures.

42.18.2.a. Where the manufacturer procedures are unavailable, the employer must develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments.

42.18.2.b. Procedures for the operational controls must be developed by a qualified person.

42.18.2.c. Procedures related to the capacity of the equipment must be developed and signed by a registered professional engineer familiar with the equipment.

#### 42.18.3. Accessibility of procedures.

42.18.3.a. The procedures applicable to the operation of the equipment, including rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions, and operator's manual, must be readily available in the cab at all times for use by the operator.

42.18.3.b. Where rated capacities are available in the cab only in electronic form: In the event of a failure which makes the rated capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the rated capacities (in electronic or other form) are available.

42.18.4. The operator must not engage in any practice or activity that diverts his/her attention while actually engaged in operating the equipment, such as the use of cellular phones (other than when used for signal communications).

#### 42.18.5. Leaving the equipment unattended.

42.18.5.a. The operator must not leave the controls while the load is suspended, except where all of the following are met:

42.18.5.a.1. The operator remains adjacent to the equipment and is not engaged in any other duties.

42.18.5.a.2. The load is to be held suspended for a period of time exceeding normal lifting operations.

42.18.5.a.3. The competent person determines that it is safe to do so and implements measures necessary to restrain the boom hoist and telescoping, load, swing, and outrigger or stabilizer functions.

42.18.5.a.4. Barricades or caution lines, and notices, are erected to prevent all employees from entering the fall zone. No employees, including those listed in §§36-23-42.26.2.a., 36-23-42.26.4. or 36-23-42.26.5. are permitted in the fall zone.

42.18.5.b. The provisions in §36-23-42.18.5.a. do not apply to working gear (such as slings, spreader bars, ladders, and welding machines) where the weight of the working gear is negligible relative to the lifting capacity of the equipment as positioned, and the working gear is suspended over an area other than an entrance or exit.

42.18.6. Tag-out.

42.18.6.a. Tagging out of service equipment/functions. Where the employer has taken the equipment out of service, a tag must be placed in the cab stating that the equipment is out of service and is not to be used. Where the employer has taken a function(s) out of service, a tag must be placed in a conspicuous position stating that the function is out of service and is not to be used.

42.18.6.b. Response to “do not operate”/tag-out signs.

42.18.6.b.1. If there is a warning (tag-out or maintenance/do not operate) sign on the equipment or starting control, the operator must not activate the switch or start the equipment until the sign has been removed by a person authorized to remove it, or until the operator has verified that:

42.18.6.b.1.A. No one is servicing, working on, or otherwise in a dangerous position on the machine.

42.18.6.b.1.B. The equipment has been repaired and is working properly.

42.18.6.b.2. If there is a warning (tag-out or maintenance/do not operate) sign on any other switch or control, the operator must not activate that switch or control until the sign has been removed by a person authorized to remove it, or until the operator has verified that the requirements in §§36-23-42.18.6.b.1.A. and 36-23-42.18.6.b.1.B. have been met.

42.18.7. Before starting the engine, the operator must verify that all controls are in the proper starting position and that all personnel are in the clear.

42.18.8. Storm warning. When a local storm warning has been issued, the competent person must determine whether it is necessary to implement manufacturer recommendations for securing the equipment.

42.18.9. If equipment adjustments or repairs are necessary:

42.18.9.a. The operator must, in writing, promptly inform the person designated by the employer to receive such information and, where there are successive shifts, to the next operator; and

42.18.9.b. The employer must notify all affected employees, at the beginning of each shift, of the necessary adjustments or repairs and all alternative measures.

42.18.10. Safety devices and operational aids must not be used as a substitute for the exercise of professional judgment by the operator.

42.18.11. If the competent person determines that there is a slack rope condition requiring

re-spooling of the rope, it must be verified (before starting to lift) that the rope is seated on the drum and in the sheaves as the slack is removed.

42.18.12. The competent person must adjust the equipment and/or operations to address the effect of wind, ice, and snow on equipment stability and rated capacity.

42.18.13. Compliance with rated capacity.

42.18.13.a. The equipment must not be operated in excess of its rated capacity.

42.18.13.b. The operator must not be required to operate the equipment in a manner that would violate §36-23-42.18.13.a.

42.18.13.c. Load weight. The operator must verify that the load is within the rated capacity of the equipment by at least one (1) of the following methods:

42.18.13.c.1. The weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer), or by a calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. In addition, when requested by the operator, this information must be provided to the operator prior to the lift; or

42.18.13.c.2. The operator must begin hoisting the load to determine, using a load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter, if it exceeds seventy-five (75) percent of the maximum rated capacity at the longest radius that will be used during the lift operation. If it does, the operator must not proceed with the lift until he/she verifies the weight of the load in accordance with §36-23-42.18.13.c.1.

42.18.14. The boom or other parts of the equipment must not contact any obstruction.

42.18.15. The equipment must not be used to drag or pull loads sideways.

42.18.16. On wheel-mounted equipment, no loads must be lifted over the front area, except as permitted by the manufacturer.

42.18.17. The operator must test the brakes each time a load that is ninety (90) percent or more of the maximum line pull is handled by lifting the load a few inches and applying the brakes. In duty cycle and repetitive lifts where each lift is ninety (90) percent or more of the maximum line pull, this requirement applies to the first lift but not to successive lifts.

42.18.18. Neither the load nor the boom must be lowered below the point where less than two (2) full wraps of rope remain on their respective drums.

42.18.19. Traveling with a load.

42.18.19.a. Traveling with a load is prohibited if the practice is prohibited by the manufacturer.

42.18.19.b. Where traveling with a load, the employer must ensure that:

42.18.19.b.1. A competent person supervises the operation, determines if it is necessary

to reduce rated capacity, and makes determinations regarding load position, boom location, ground support, travel route, overhead obstructions, and speed of movement necessary to ensure safety.

42.18.19.b.2. The determinations of the competent person required in §36-23-42.18.19.b.1. are implemented.

42.18.19.b.3. For equipment with tires, tire pressure specified by the manufacturer is maintained.

42.18.20. Rotational speed of the equipment must be such that the load does not swing out beyond the radius at which it can be controlled.

42.18.21. A tag or restraint line must be used if necessary to prevent rotation of the load that would be hazardous.

42.18.22. The brakes must be adjusted in accordance with manufacturer procedures to prevent unintended movement.

42.18.23. The operator must obey a stop (or emergency stop) signal, irrespective of who gives it.

42.18.24. Swinging locomotive cranes. A locomotive crane must not be swung into a position where railway cars on an adjacent track could strike it, until it is determined that cars are not being moved on the adjacent track and that proper flag protection has been established.

42.18.25. Counterweight/ballast.

42.18.25.a. The following applies to equipment other than tower cranes:

42.18.25.a.1. Equipment must not be operated without the counterweight or ballast in place as specified by the manufacturer.

42.18.25.a.2. The maximum counterweight or ballast specified by the manufacturer for the equipment must not be exceeded.

42.18.25.b. Counterweight/ballast requirements for tower cranes are specified in §36-23-42.35.2.h. (counterweight/ballast).

42.19. Authority to stop operation.

42.19.1. Whenever there is a concern as to safety, the operator must have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

42.20. Signals. General requirements.

42.20.1. A signal person must be provided in each of the following situations:

42.20.1.a. The point of operation, meaning the load travel or the area near or at load placement, is not in full view of the operator.

42.20.1.b. When the equipment is traveling, the view in the direction of travel is obstructed.

42.20.1.c. Due to site specific safety concerns, either the operator or the person handling the load determines that it is necessary.

42.20.2. Types of signals. Signals to operators must be by hand, voice, audible, or new signals.

42.20.3. Hand signals.

42.20.3.a. When using hand signals, the Standard Method must be used (see §36-23-42.23.) Exception: Where use of the Standard Method for hand signals is infeasible, or where an operation or use of an attachment is not covered in the Standard Method, non-standard hand signals may be used in accordance with §36-23-42.20.3.b.

42.20.3.b. Non-standard hand signals. When using non-standard hand signals, the signal person, operator, and lift director (where there is one) must contact each other prior to the operation and agree on the non-standard hand signals that will be used.

42.20.4. New signals. Signals other than hand, voice, or audible signals may be used where the employer demonstrates that:

42.20.4.a. The new signals provide at least equally effective communication as voice, audible, or Standard Method hand signals, or

42.20.4.b. The new signals comply with a national consensus standard that provides at least equally effective communication as voice, audible, or Standard Method hand signals.

42.20.5. Suitability. The signals used (hand, voice, audible, or new), and means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.), must be appropriate for the site conditions.

42.20.6. During operations requiring signals, the ability to transmit signals between the operator and signal person must be maintained. If that ability is interrupted at any time, the operator must safely stop operations requiring signals until it is reestablished and a proper signal is given and understood.

42.20.7. If the operator becomes aware of a safety problem and needs to communicate with the signal person, the operator must safely stop operations. Operations must not resume until the operator and signal person agree that the problem has been resolved.

42.20.8. Only one (1) person may give signals to a crane/derrick at a time, except in circumstances covered by §36-23-42.20.9.

42.20.9. Anyone who becomes aware of a safety problem must alert the operator or signal person by giving the stop or emergency stop signal. (Note: §36-23-42.18.23. requires the operator to obey a stop or emergency stop signal.)

42.20.10. All directions given to the operator by the signal person must be given from the operator's direction perspective.

42.20.11. Communication with multiple cranes/derricks. Where a signal person(s) is in communication with more than one (1) crane/derrick, a system must be used for identifying the crane/derrick each signal is for, as follows:

42.20.11.a. for each signal, prior to giving the function/direction, the signal person must identify the crane/derrick the signal is for, or

42.20.11.b. must use an equally effective method of identifying which crane/derrick the signal is for.

42.21. Signals. Radio, telephone or other electronic transmission of signals.

42.21.1. The device(s) used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.

42.21.2. Signal transmission must be through a dedicated channel, except:

42.21.2.a. Multiple cranes/derricks and one (1) or more signal persons may share a dedicated channel for the purpose of coordinating operations.

42.21.2.b. Where a crane is being operated on or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same or adjacent tracks.

42.21.3. The operator's reception of signals must be by a hands-free system.

42.22. Signals. Voice signals. Additional requirements.

42.22.1. Prior to beginning operations, the operator, signal person and lift director (if there is one), must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these workers need not meet again to discuss voice signals unless another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed.

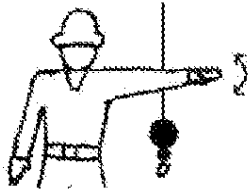
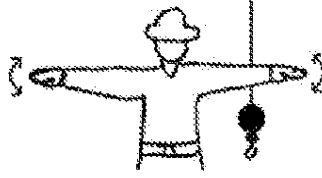
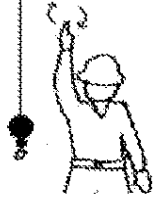
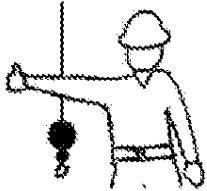
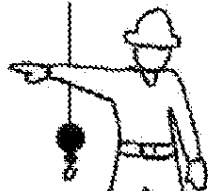
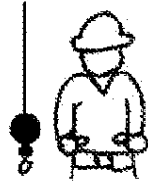
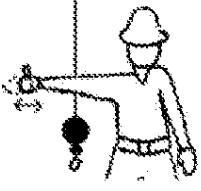
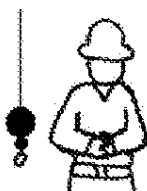

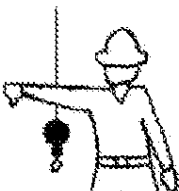
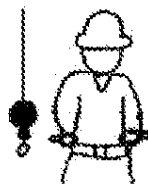
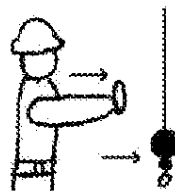
42.22.2. Each voice signal must contain the following three elements, given in the following order: function (such as hoist, boom, etc.), direction; distance and/or speed; function, stop command.

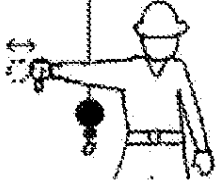
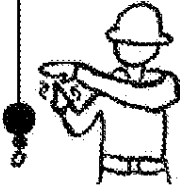
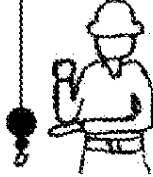
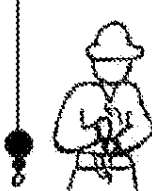
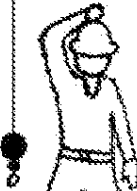
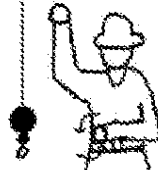
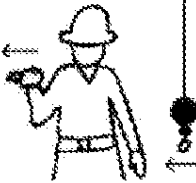
42.22.3. The operator, signal person and lift director (if there is one), must be able to effectively communicate in the language used.

42.23. Signals. Hand signal chart.

42.23.1. Hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations.

Table 36-23N. Standard Hand Signals.

 <p><b>STOP</b> – With arm extended horizontally to the side, palm down, arm is swung back and forth.</p>	 <p><b>EMERGENCY STOP</b> – With both arms extended horizontally to the side, palms down, arms are swung back and forth.</p>	 <p><b>HOIST</b> – With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.</p>
 <p><b>RAISE BOOM</b> – With arm extended horizontally to the side, thumb points up with other fingers closed.</p>	 <p><b>SWING</b> – With arm extended horizontally, index finger points in direction that boom is to swing.</p>	 <p><b>RETRACT TELESCOPING BOOM</b> – With hands to the front at waist level, thumbs point at each other with other fingers closed.</p>
 <p><b>RAISE THE BOOM AND LOWER THE LOAD</b> – With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.</p>	 <p><b>DOG EVERYTHING</b> – Hands held together at waist level.</p>	 <p><b>LOWER</b> – With arm and index finger pointing down, hand and finger make small circles.</p>
 <p><b>LOWER BOOM</b> – With arm extended horizontally to the side, thumb points down with other fingers closed.</p>	 <p><b>EXTEND TELESCOPING BOOM</b> – With hands to the front at waist level, thumbs point outward with other fingers closed.</p>	 <p><b>TRAVEL/TOWER TRAVEL</b> – With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.</p>

 <p><b>LOWER THE BOOM AND RAISE THE LOAD</b> – With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.</p>	 <p><b>MOVE SLOWLY</b> – A hand is placed in front of the hand that is giving the action signal.</p>	 <p><b>USE AUXILIARY HOIST</b> (whipline) – With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.</p>
 <p><b>CRAWLER CRANE TRAVEL, BOTH TRACKS</b> – Rotate fists around each other in front of body; direction of rotation away from body indicates travel forward; rotation towards body indicates travel backward.</p>	 <p><b>USE MAIN HOIST</b> – A hand taps on top of the head. Then regular signal is given to indicate desired action.</p>	 <p><b>CRAWLER CRANE TRAVEL, ONE TRACK</b> – Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.</p>
 <p><b>TROLLEY TRAVEL</b> – With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.</p>		

#### 42.24. Fall protection.

##### 42.24.1. Application.

42.24.1.a. Subsections 36-23-42.24.2., 36-23-42.24.3.c., 36-23-42.24.5., and 36-23-42.24.6. apply to all equipment covered by this Section except tower cranes.

42.24.1.b. Subdivisions 36-23-42.24.3.a. and 36-24-42.24.3.b. and Subsections 36-23-42.24.4., 36-23-42.24.7., 36-23-42.24.9., and 36-23-42.24.10. apply to all equipment covered by §36-23-42.

42.24.1.c. Subdivision 36-23-42.24.3.d. and Subsection 36-23-42.24.8. apply only to tower cranes.

##### 42.24.2. Boom walkways.

42.24.2.a. Equipment manufactured after November 8, 2011 with lattice booms must be equipped with walkways on the boom(s) if the vertical profile of the boom (from cord centerline to cord centerline) is six (6) or more feet.

42.24.2.b. Boom walkway criteria.

42.24.2.b.1. The walkways must be at least twelve (12) inches wide.

42.24.2.b.2. Guardrails, railings and other permanent fall protection attachments along walkways are:

42.24.2.b.2.A. Not required.

42.24.2.b.2.B. Prohibited on booms supported by pendant ropes or bars if the guardrails/railings/attachments could be snagged by the ropes or bars.

42.24.2.b.2.C. Prohibited if of the removable type (designed to be installed and removed each time the boom is assembled/disassembled).

42.24.2.b.2.D. Where not prohibited, guardrails or railings may be of any height up to, but not more than, forty-five (45) inches.

42.24.3. Steps, handholds, ladders, grabrails, guardrails and railings.

42.24.3.a. Subsection 36-24-42.4.2. does not apply to equipment covered by this Section.

42.24.3.b. The employer must maintain in good condition originally-equipped steps, handholds, ladders and guardrails/railings/grabrails.

42.24.3.c. Equipment manufactured after November 8, 2011 must be equipped so as to provide safe access and egress between the ground and the operator work station(s), including the forward and rear positions, by the provision of devices such as steps, handholds, ladders, and guardrails/railings/grabrails. These devices must meet the following criteria:

42.24.3.c.1. Steps, handholds, ladders and guardrails/railings/grabrails must meet the criteria of SAE J185 (May 2003) (incorporated by reference, see §1926.6) or ISO 11660-2:1994(E) (incorporated by reference, see § 1926.6) except where infeasible.

42.24.3.c.2. Walking/stepping surfaces, except for crawler treads, must have slip-resistant features/properties (such as diamond plate metal, strategically placed grip tape, expanded metal, or slip-resistant paint).

42.24.3.d. Tower cranes manufactured after November 8, 2011 must be equipped so as to provide safe access and egress between the ground and the cab, machinery platforms, and tower (mast), by the provision of devices such as steps, handholds, ladders, and guardrails/railings/grabrails. These devices must meet the following criteria:

42.24.3.d.1. Steps, handholds, ladders, and guardrails/railings/grabrails must meet the criteria of ISO 11660-1:2008(E) (incorporated by reference, see OSHA §1926.6) and ISO 11660-3:2008(E) (incorporated by reference, see OSHA §1926.6) or SAE J185 (May 2003) (incorporated by reference, see OSHA §1926.6) except where infeasible.

42.24.3.d.2. Walking/stepping surfaces must have slip-resistant features/properties (such as diamond plate metal, strategically placed grip tape, expanded metal, or slip-resistant paint).

42.24.4. Personal fall arrest and fall restraint systems. Personal fall arrest system components must be used in personal fall arrest and fall restraint systems and must conform to the criteria in §36-23-

42.4.4. except that §36-23-42.4.4.o. does not apply to components used in personal fall arrest and fall restraint systems. Either body belts or body harnesses must be used in personal fall arrest and fall restraint systems.

42.24.5. For non-assembly/disassembly work, the employer must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than six (6) feet above a lower level as follows:

42.24.5.a. When moving point-to-point:

42.25.5.a.1. On non-lattice booms (whether horizontal or not horizontal).

42.25.5.a.2. On lattice booms that are not horizontal.

42.25.5.a.3. On horizontal lattice booms where the fall distance is fifteen (15) feet or more.

42.24.5.b. While at a work station on any part of the equipment (including the boom, of any type), except when the employee is at or near draw-works (when the equipment is running), in the cab, or on the deck.

42.24.6. For assembly/disassembly work, the employer must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than fifteen (15) feet above a lower level, except when the employee is at or near draw-works (when the equipment is running), in the cab, or on the deck.

42.24.7. Anchorage criteria.

42.24.7.a. Subdivisions 36-23-41.4.4.o. and 36-23-41.4.5.b. apply to equipment covered by this Section only to the extent delineated in §36-23-42.24.7.b.

42.24.7.b. Anchorages for personal fall arrest and positioning device systems.

42.24.7.b.1. Personal fall arrest systems must be anchored to any apparently substantial part of the equipment unless a competent person, from a visual inspection, without an engineering analysis, would conclude that the criteria in §36-23-42.4.4.o. would not be met.

42.24.7.b.2. Positioning device systems must be anchored to any apparently substantial part of the equipment unless a competent person, from a visual inspection, without an engineering analysis, would conclude that the criteria in §36-23-42.4.5.b. would not be met.

42.24.7.b.3. Attachable anchor devices (portable anchor devices that are attached to the equipment) must meet the anchorage criteria in §36-23-42.4.4.o. for personal fall arrest systems and §36-23-42.4.5.b. for positioning device systems.

42.24.7.c. Anchorages for fall restraint systems. Fall restraint systems must be anchored to any part of the equipment that is capable of withstanding twice the maximum load that an employee may impose on it during reasonably anticipated conditions of use.

42.24.8. Tower cranes.

42.24.8.a. For work other than erecting, climbing, and dismantling, the employer must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than six (6) feet above a lower level, except when the employee is at or near draw-works (when the equipment is running), in the cab, or on the deck.

42.24.8.b. For erecting, climbing, and dismantling work, the employer must provide and

ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than fifteen (15) feet above a lower level.

42.24.9. Anchoring to the load line. A personal fall arrest system is permitted to be anchored to the crane/derrick's hook (or other part of the load line) where all of the following requirements are met:

42.24.9.a. A qualified person has determined that the set-up and rated capacity of the crane/derrick (including the hook, load line and rigging) meets or exceeds the requirements in §36-23-42.4.4.o.

42.24.9.b. The equipment operator must be at the work site and informed that the equipment is being used for this purpose.

42.24.9.c. No load is suspended from the load line when the personal fall arrest system is anchored to the crane/derrick's hook (or other part of the load line).

42.24.10. Training. The employer must train each employee who may be exposed to fall hazards while on, or hoisted by, equipment covered by this Subsection on all of the following:

42.24.10.a. the requirements in this Section that address fall protection.

42.24.10.b. the applicable requirements in §§36-23-42.1. through 36-23-42.4.

42.25. Work area control.

42.25.1. Swing radius hazards.

42.25.1.a. The requirements in §36-23-42.25.1.b. apply where there are accessible areas in which the equipment's rotating superstructure (whether permanently or temporarily mounted) poses a reasonably foreseeable risk of:

42.25.1.a.1. Striking and injuring an employee; or

42.25.1.a.2. Pinching/crushing an employee against another part of the equipment or another object.

42.25.1.b. To prevent employees from entering these hazard areas, the employer must:

42.25.1.b.1. Train each employee assigned to work on or near the equipment ("authorized personnel") in how to recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure.

42.25.1.b.2. Erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard areas. Exception: When the employer can demonstrate that it is neither feasible to erect such barriers on the ground nor on the equipment, the hazard areas must be clearly marked by a combination of warning signs (such as "Danger--Swing/Crush Zone") and high visibility markings on the equipment that identify the hazard areas. In addition, the employer must train each employee to understand what these markings signify.

42.25.1.c. Protecting employees in the hazard area.

42.25.1.c.1. Before an employee goes to a location in the hazard area that is out of view of the operator, the employee (or someone instructed by the employee) must ensure that the operator is informed that he/she is going to that location.

42.25.1.c.2. Where the operator knows that an employee went to a location covered by §36-23-42.25.1.a., the operator must not rotate the superstructure until the operator is informed in accordance with a pre-arranged system of communication that the employee is in a safe position.

42.25.2. Where any part of a crane/derrick is within the working radius of another crane/derrick, the controlling entity must institute a system to coordinate operations. If there is no controlling entity, the employer (if there is only one (1) employer operating the multiple pieces of equipment), or employers, must institute such a system.

42.26. Keeping clear of the load.

42.26.1. Where available, hoisting routes that minimize the exposure of employees to hoisted loads must be used, to the extent consistent with public safety.

42.26.2. While the operator is not moving a suspended load, no employee must be within the fall zone, except for employees:

42.26.2.a. Engaged in hooking, unhooking or guiding a load;

42.26.2.b. Engaged in the initial attachment of the load to a component or structure; or

42.26.2.c. Operating a concrete hopper or concrete bucket.

42.26.3. When employees are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, all of the following criteria must be met:

42.26.3.a. The materials being hoisted must be rigged to prevent unintentional displacement.

42.26.3.b. Hooks with self-closing latches or their equivalent must be used. Exception: "J" hooks are permitted to be used for setting wooden trusses.

42.26.3.c. The materials must be rigged by a qualified rigger.

42.26.4. Receiving a load. Only employees needed to receive a load are permitted to be within the fall zone when a load is being landed.

42.26.5. During a tilt-up or tilt-down operation:

42.26.5.a. No employee must be directly under the load.

42.26.5.b. Only employees essential to the operation are permitted in the fall zone (but not directly under the load). An employee is essential to the operation if the employee is conducting one of the following operations and the employer can demonstrate it is infeasible for the employee to perform that operation from outside the fall zone: (1) Physically guide the load; (2) closely monitor and give instructions regarding the load's movement; or (3) either detach it from or initially attach it to another component or structure (such as, but not limited to, making an initial connection or installing bracing).

42.26.6. Boom free fall is prohibited when an employee is in the fall zone of the boom or load, and load line free fall is prohibited when an employee is directly under the load. (See §36-23-42.27.)

42.27. Free fall and controlled load lowering.

42.27.1. Boom free fall prohibitions.

42.27.1.a. The use of equipment in which the boom is designed to free fall (live boom) is prohibited in each of the following circumstances:

42.27.1.a.1. An employee is in the fall zone of the boom or load.

42.27.1.a.2. An employee is being hoisted.

42.27.1.a.3. The load or boom is directly over a power line, or over any part of the area

extending the Table 36-23L of §36-23-42.9. clearance distance to each side of the power line; or any part of the area extending the Table 36-23L clearance distance to each side of the power line is within the radius of vertical travel of the boom or the load.

42.27.1.a.4. The load is over a shaft, except where there are no employees in the shaft.

42.27.1.a.5. The load is over a cofferdam, except where there are no employees in the fall zone of the boom or the load.

42.27.1.a.6. Lifting operations are taking place in a refinery or tank farm.

42.27.1.b. The use of equipment in which the boom is designed to free fall (live boom) is permitted only where none of the circumstances listed in §36-23-42.27.1.a. are present and:

42.27.1.b.1. The equipment was manufactured prior to October 31, 1984; or

42.27.1.b.2. The equipment is a floating crane/derrick or a land crane/derrick on a vessel/flotation device.

42.27.2. Preventing boom free fall. Where the use of equipment with a boom that is designed to free fall (live boom) is prohibited, the boom hoist must have a secondary mechanism or device designed to prevent the boom from falling in the event the primary system used to hold or regulate the boom hoist fails, as follows:

42.27.2.a. Friction drums must have:

42.27.2.a.1. A friction clutch and, in addition, a braking device, to allow for controlled boom lowering.

42.27.2.a.2. A secondary braking or locking device, which is manually or automatically engaged, to back-up the primary brake while the boom is held (such as a secondary friction brake or a ratchet and pawl device).

42.27.2.b. Hydraulic drums must have an integrally mounted holding device or internal static brake to prevent boom hoist movement in the event of hydraulic failure.

42.27.2.c. Neither clutches nor hydraulic motors must be considered brake or locking devices for purposes of this Subdivision.

42.27.2.d. Hydraulic boom cylinders must have an integrally mounted holding device.

42.27.3. Preventing uncontrolled retraction. Hydraulic telescoping booms must have an integrally mounted holding device to prevent the boom from retracting in the event of hydraulic failure.

42.27.4. Load line free fall. In each of the following circumstances, controlled load lowering is required and free fall of the load line hoist is prohibited:

42.27.4.a. An employee is directly under the load.

42.27.4.b. An employee is being hoisted.

42.27.4.c. The load is directly over a power line, or over any part of the area extending the (Table 36-23L of §36-23-42.9.) clearance distance to each side of the power line; or any part of the area extending the (Table 36-23L of §36-23-42.9.) clearance distance to each side of the power line is within the radius of vertical travel of the load.

42.27.4.d. The load is over a shaft.

42.27.4.e. The load is over a cofferdam, except where there are no employees in the fall zone

of the load.

42.28. Operator training, certification, and evaluation.

42.28.1. General requirements for operators. The employer must ensure that each operator is trained, certified/licensed, and evaluated in accordance with this Section before operating any equipment covered under §36-23-42, except for the equipment listed in §36-23-42.28.1.b. (exceptions).

42.28.1.a. Operation during training. An employee who has not been certified/licensed and evaluated to operate assigned equipment in accordance with this Section may only operate the equipment as an operator-in-training under supervision in accordance with the requirements of §36-23-42.28.2. (operator training).

42.28.1.b. Exceptions. Operators of derricks (see §36-23-42.36. (derricks)), sideboom cranes (see §36-23-42.40.), or equipment with a maximum manufacturer-rated hoisting/lifting capacity of two thousand (2,000) pounds or less (see §36-23-42.41.) are not required to comply with §36-23-42.28. Note: The training requirements in those other sections continue to apply (for the training requirement for operators of sideboom cranes, follow §36-23-42.2.1.c. (operators)).

42.28.1.c. Qualification by the U.S. military.

42.28.1.c.1. For purposes of this Section, an operator who is an employee of the U.S. military meets the requirements of this Section if he/she has a current operator qualification issued by the U.S. military for operation of the equipment. An employee of the U.S. military is a federal employee of the Department of Defense or Armed Forces and does not include employees of private contractors.

42.28.1.c.2. A qualification under this Section is:

42.28.1.c.2.A. Not portable: Such a qualification meets the requirements of §36-23-42.28.1. only where the operator is employed by (and operating the equipment for) the employer that issued the qualification.

42.28.1.c.2.B. Valid for the period of time stipulated by the issuing entity.

42.28.2. Operator training. The employer must provide each operator-in-training with sufficient training, through a combination of formal and practical instruction, to ensure that the operator-in-training develops the skills, knowledge, and ability to recognize and avert risk necessary to operate the equipment safely for assigned work.

42.28.2.a. The employer must provide instruction on the knowledge and skills listed in §§36-23-42.28.8.a. and 36-23-42.28.8.b. to the operator-in-training.

42.28.2.b. The operator-in-training must be continuously monitored on site by a trainer while operating equipment.

42.28.2.c. The employer may only assign tasks within the operator-in-training's ability. However, except as provided in §36-23-42.28.2.c.5., the operator-in-training shall not operate the equipment in any of the following circumstances unless certified in accordance with §36-23-42.28.3.:

42.28.2.c.1. If any part of the equipment, load line, or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone (see §36-23-42.9.1.a.), could get within twenty (20) feet of a power line that is up to 350 kV, or within fifty (50) feet of a power line that is over 350 kV.

42.28.2.c.2. If the equipment is used to hoist personnel.

42.28.2.c.3. In multiple-equipment lifts.

42.28.2.c.4. If the equipment is used over a shaft, cofferdam, or in a tank farm.

42.28.2.c.5. In multiple-lift rigging operations, except where the operator's trainer determines that the operator-in-training's skills are sufficient for this high-skill work.

42.28.2.d. The employer must ensure that an operator-in-training is monitored as follows when operating equipment covered by this Subsection:

42.28.2.d.1. While operating the equipment, the operator-in-training must be continuously monitored by an individual ("operator's trainer") who meets all of the following requirements:

42.28.2.d.1.A. The operator's trainer is an employee or agent of the operator-in-training's employer.

42.28.2.d.1.B. The operator's trainer has the knowledge, training, and experience necessary to direct the operator-in-training on the equipment in use.

42.28.2.d.2. While monitoring the operator-in-training, the operator's trainer performs no tasks that detract from the trainer's ability to monitor the operator-in-training.

42.28.2.d.3. For equipment other than tower cranes: The operator's trainer and the operator-in-training must be in direct line of sight of each other. In addition, they must communicate verbally or by hand signals. For tower cranes: The operator's trainer and the operator-in-training must be in direct communication with each other.

42.28.2.d.4. The operator-in-training must be monitored by the operator's trainer at all times, except for short breaks where all of the following are met:

42.28.2.d.4.A. The break lasts no longer than fifteen (15) minutes and there is no more than one (1) break per hour.

42.28.2.d.4.B. Immediately prior to the break the operator's trainer informs the operator-in-training of the specific tasks that the operator-in-training is to perform and limitations to which he/she must adhere during the operator trainer's break.

42.28.2.d.4.C. The specific tasks that the operator-in-training will perform during the operator trainer's break are within the operator-in-training's abilities.

42.28.2.e. Retraining. The employer must provide retraining in relevant topics for each operator when, based on the performance of the operator or an evaluation of the operator's knowledge, there is an indication that retraining is necessary.

42.28.3. Operator certification and licensing. The employer must ensure that each operator is certified or licensed to operate the equipment as follows:

42.28.3.a. Licensing. When a state or local government issues operator licenses for equipment covered under §36-24-42, the equipment operator must be licensed by that government entity for operation of equipment within that entity's jurisdiction if that government licensing program meets the following requirements:

42.28.3.a.1. The requirements for obtaining the license include an assessment, by written and practical tests, of the operator applicant regarding, at a minimum, the knowledge and skills listed in §§36-23-42.28.8.a. and 36-23-28.8.b.

42.28.3.a.2. The testing meets industry-recognized criteria for written testing materials, practical examinations, test administration, grading, facilities/equipment, and personnel.

42.28.3.a.3. The government authority that oversees the licensing department/office has determined that the requirements in §36-23-42.28.3.a.1. have been met.

42.28.3.a.4. The licensing department/office has testing procedures for re-licensing designed to ensure that the operator continues to meet the technical knowledge and skills requirements in §§36-23-42.28.8.a. and 36-23-42.28.8.b.

42.28.3.a.5. For the purposes of compliance with this Section, a license is valid for the period of time stipulated by the licensing department/office, but no longer than five (5) years.

42.28.3.b. Certification. When an operator is not required to be licensed under §36-23-42.28.3.a., the operator must be certified in accordance with §§36-23-42.28.4. or 36-23-42.28.5.

42.28.3.c. No cost to employees. Whenever operator certification/licensure is required under this Section, the employer must provide the certification/licensure at no cost to employees.

42.28.3.d. Provision of testing and training. A testing entity is permitted to provide training as well as testing services as long as the criteria of the applicable governmental or accrediting agency (in the option selected) for an organization providing both services are met.

42.28.4. Certification by an accredited crane operator testing organization.

42.28.4.a. For a certification to satisfy the requirements of this Subsection, the crane operator testing organization providing the certification must:

42.28.4.a.1. Be accredited by a nationally recognized accrediting agency based on that agency's determination that industry-recognized criteria for written testing materials, practical examinations, test administration, grading, facilities/equipment, and personnel have been met.

42.28.4.a.2. Administer written and practical tests that:

42.28.4.a.2.A. Assess the operator applicant regarding, at a minimum, the knowledge and skills listed in §§36-23-42.28.8.a. and 36-23-42.28.8.b.

42.28.4.a.2.B. Provide certification based on equipment type, or type and capacity.

42.28.4.a.3. Have procedures for operators to re-apply and be re-tested in the event an operator applicant fails a test or is decertified.

42.28.4.a.4. Have testing procedures for re-certification designed to ensure that the operator continues to meet the technical knowledge and skills requirements in §§36-23-42.28.8.a. and 36-23-42.28.8.b.

42.28.4.a.5. Have its accreditation reviewed by the nationally recognized accrediting agency at least every three (3) years.

42.28.4.b. If no accredited testing agency offers certification examinations for a particular type of equipment, an operator will be deemed to have complied with the certification requirements of this Section for that equipment if the operator has been certified for the type that is most similar to that equipment and for which a certification examination is available. The operator's certificate must state the type of equipment for which the operator is certified.

42.28.4.c. A certification issued under §36-23-42.28.4. is portable among employers who are required to have operators certified under this option.

42.28.4.d. A certification issued under this Subsection is valid for five (5) years.

42.28.5. Audited employer program. The employer's certification of its employee must meet the

following requirements:

42.28.5.a. Testing. The written and practical tests must be either:

42.28.5.a.1. Developed by an accredited crane operator testing organization (see §36-23-42.28.4.); or

42.28.5.a.2. Approved by an auditor in accordance with the following requirements:

42.28.5.a.2.A. The auditor is certified to evaluate such tests by an accredited crane operator testing organization (see §36-23-42.28.4.).

42.28.5.a.2.B. The auditor is not an employee of the employer.

42.28.5.a.2.C. The approval must be based on the auditor's determination that the written and practical tests meet nationally recognized test development criteria and are valid and reliable in assessing the operator applicants regarding, at a minimum, the knowledge and skills listed in §§36-23-42.28.8.a. and 36-23-42.28.8.b.

42.28.5.a.2.D. The audit must be conducted in accordance with nationally recognized auditing standards.

42.28.5.b. Administration of tests.

42.28.5.b.1. The written and practical tests must be administered under circumstances approved by the auditor as meeting nationally recognized test administration standards.

42.28.5.b.2. The auditor must be certified to evaluate the administration of the written and practical tests by an accredited crane operator testing organization (see §36-23-42.28.4.).

42.28.5.b.3. The auditor must not be an employee of the employer.

42.28.5.b.4. The audit must be conducted in accordance with nationally recognized auditing standards.

42.28.5.c. Timing of audit. The employer program must be audited within three (3) months of the beginning of the program and at least every three (3) years thereafter.

42.28.5.d. Re-qualification. The employer program must have testing procedures for re-qualification designed to ensure that the operator continues to meet the technical knowledge and skills requirements in §§36-23-42.28.8.a. and 36-23-42.28.8.b. The re-qualification procedures must be audited in accordance with §§36-23-42.28.5.a. and 36-23-42.28.5.b.

42.28.5.e. Deficiencies. If the auditor determines that there is a significant deficiency in the program, the employer must ensure that:

42.28.5.e.1. No operator is qualified until the auditor confirms that the deficiency has been corrected.

42.28.5.e.2. The program is audited again within one hundred eighty (180) days of the confirmation that the deficiency was corrected.

42.28.5.e.3. The auditor files a documented report of the deficiency to the appropriate Regional Office of the Occupational Safety and Health Administration within fifteen (15) days of the auditor's determination that there is a deficiency.

42.28.5.e.4. Records of the audits of the employer's program are maintained by the auditor for three (3) years and are made available by the auditor to the Secretary of Labor or the

Secretary's designated representative upon request.

42.28.5.f. Audited-program certificates. A certification under this Subdivision is:

42.28.5.f.1. Not portable: Such a certification meets the requirements of §36-23-42.28.3. only where the operator is employed by (and operating the equipment for) the employer that issued the certification.

42.28.5.f.2. Valid for five (5) years.

42.28.6. Evaluation.

42.28.6.a. Through an evaluation, the employer must ensure that each operator is qualified by a demonstration of:

42.28.6.a.1. The skills and knowledge, as well as the ability to recognize and avert risk, necessary to operate the equipment safely, including those specific to the safety devices, operational aids, software, and the size and configuration of the equipment. Size and configuration includes, but is not limited to, lifting capacity, boom length, attachments, luffing jib, and counterweight set-up.

42.28.6.a.2. The ability to perform the hoisting activities required for assigned work, including, if applicable, blind lifts, personnel hoisting, and multi-crane lifts.

42.28.6.b. For operators employed prior to December 10, 2018, the employer may rely on its previous assessments of the operator in lieu of conducting a new evaluation of that operator's existing knowledge and skills.

42.28.6.c. The definition of "qualified" in §36-23-42.1.79. does not apply to §36-23-42.28.6.a. Possession of a certificate or degree cannot, by itself, cause a person to be qualified for purposes of §36-23-42.28.6.a.

42.28.6.d. The evaluation required under §36-23-42.28.6.a. must be conducted by an individual who has the knowledge, training, and experience necessary to assess equipment operators.

42.28.6.e. The evaluator must be an employee or agent of the employer. Employers that assign evaluations to an agent retain the duty to ensure that the requirements in §36-23-42.28.6. (evaluation) are satisfied. Once the evaluation is completed successfully, the employer may allow the operator to operate other equipment that the employer can demonstrate does not require substantially different skills, knowledge, or ability to recognize and avert risk to operate.

42.28.6.f. The employer must document the completion of the evaluation. This document must provide: The operator's name; the evaluator's name and signature; the date; and the make, model, and configuration of equipment used in the evaluation. The employer must make the document available at the worksite while the operator is employed by the employer. For operators assessed per §36-23-42.28.6.b., the documentation must reflect the date of the employer's determination of the operator's abilities and the make, model and configuration of equipment on which the operator has previously demonstrated competency.

42.28.6.g. When an employer is required to provide an operator with retraining under §36-23-42.28.2.e., the employer must re-evaluate the operator with respect to the subject of the retraining.

42.28.7. Language and literacy requirements.

42.28.7.a. Tests under this Section may be administered verbally, with answers given verbally, where the operator candidate:

42.28.7.a.1. Passes a written demonstration of literacy relevant to the work.

42.28.7.a.2. Demonstrates the ability to use the type of written manufacturer procedures applicable to the class/type of equipment for which the candidate is seeking certification.

42.28.7.b. Tests under this Section may be administered in any language the operator candidate understands, and the operator's certification documentation must note the language in which the test was given. The operator is only permitted to operate equipment that is furnished with materials required by this Section, such as operations manuals and load charts, that are written in the language of the certification.

42.28.8. Certification criteria. Certifications must be based on the following:

42.28.8.a. A determination through a written test that:

42.28.8.a.1. The individual knows the information necessary for safe operation of the specific type of equipment the individual will operate, including all of the following:

42.28.8.a.1.A. The controls and operational/performance characteristics.

42.28.8.a.1.B. Use of, and the ability to calculate (manually or with a calculator), load/capacity information on a variety of configurations of the equipment.

42.28.8.a.1.C. Procedures for preventing and responding to power line contact.

42.28.8.a.1.D. Technical knowledge of the subject matter criteria listed in Appendix C to Subpart CC of OSHA Part 1926 (Operator Certification; Written Examinations; Technical Knowledge Criteria) applicable to the specific type of equipment the individual will operate. Use of the Appendix C criteria meets the requirements of this Subparagraph.

42.28.8.a.1.E. Technical knowledge applicable to the suitability of the supporting ground and surface to handle expected loads, site hazards, and site access.

42.28.8.a.1.F. This Section, including applicable incorporated materials.

42.28.8.a.2. The individual is able to read and locate relevant information in the equipment manual and other materials containing information referred to in §36-23-42.28.8.a.1.

42.28.8.b. A determination through a practical test that the individual has the skills necessary for safe operation of the equipment, including the following:

42.28.8.b.1. Ability to recognize, from visual and auditory observation, the items listed in §36-23-42.13.4. (shift inspection).

42.28.8.b.2. Operational and maneuvering skills.

42.28.8.b.3. Application of load chart information.

42.28.8.b.4. Application of safe shut-down and securing procedures.

42.29. Signal person qualifications.

42.29.1. The employer of the signal person must ensure that each signal person meets the Qualification Requirements (§36-23-42.29.3.) prior to giving any signals. This requirement must be met by using either Option (1) or Option (2) of this Subsection.

42.29.1.a. Option (1)-Third party qualified evaluator. The signal person has documentation from a third party qualified evaluator (see Qualified Evaluator (third party), §36-23-42.1.79. for definition) showing that the signal person meets the Qualification Requirements. (See §36-23-42.29.3.)

42.29.1.b. Option (2)-Employer's qualified evaluator. The employer's qualified (see Qualified

Evaluator (not a third party), §36-23-42.1.78. for definition) evaluator assesses the individual and determines that the individual meets the Qualification Requirements (§36-23-42.29.3.) and provides documentation of that determination. An assessment by an employer's qualified evaluator under this option is not portable--other employers are not permitted to use it to meet the requirements of this Section.

42.29.1.c. The employer must make the documentation for whichever option is used available at the site while the signal person is employed by the employer. The documentation must specify each type of signaling (e.g., hand signals, radio signals, etc.) for which the signal person meets the requirements of §36-23-42.29.3.

42.29.2. If subsequent actions by the signal person indicate that the individual does not meet the Qualification Requirements (see §36-23-42.29.3.), the employer must not allow the individual to continue working as a signal person until re-training is provided and a re-assessment is made in accordance with §36-23-42.29.1. that confirms that the individual meets the Qualification Requirements.

42.29.3. Qualification Requirements. Each signal person must:

42.29.3.a. Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.

42.29.3.b. Be competent in the application of the type of signals used.

42.29.3.c. Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.

42.29.3.d. Know and understand the relevant requirements of §§36-23-42.20. through 36-23-42.23. and §36-23-42.29.

42.29.3.e. Demonstrate that he/she meets the requirements in §§36-23-42.29.3.a. through 36-23-42.29.3.d. through an oral or written test, and through a practical test.

42.30. Qualifications of maintenance and repair employees.

42.30.1. Maintenance, inspection and repair personnel are permitted to operate the equipment only where all of the following requirements are met:

42.30.1.a. The operation is limited to those functions necessary to perform maintenance, inspect the equipment, or verify its performance.

42.30.1.b. The personnel either:

42.30.1.b.1. Operate the equipment under the direct supervision of an operator who meets the requirements of §36-23-42.28. (operator qualification and certification); or

42.30.1.b.2. Are familiar with the operation, limitations, characteristics and hazards associated with the type of equipment.

42.30.2. Maintenance and repair personnel must meet the definition of a qualified person with respect to the equipment and maintenance/repair tasks performed.

42.31. Hoisting personnel.

42.31.1. The requirements of this Section are supplemental to the other requirements in §36-23-42. and apply when one (1) or more employees are hoisted.

42.31.2. The use of equipment to hoist employees is prohibited except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area,

such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project's structural design or worksite conditions. This Subsection does not apply to work covered by §36-23-38. (steel erection) and also does not apply to routine personnel access to an underground worksite via shaft.

#### 42.31.3. Use of personnel platform.

42.31.3.a. When using equipment to hoist employees, the employees must be in a personnel platform that meets the requirements of §36-23-42.31.6.

42.31.3.b. Exceptions: A personnel platform is not required for hoisting employees:

42.31.3.b.1. Into and out of drill shafts that are up to and including eight (8) feet in diameter. (See §36-23-42.31.14. for requirements for hoisting these employees.)

42.31.3.b.2. In pile driving operations. (See §36-23-42.31.15. for requirements for hoisting these employees.)

42.31.3.b.3. Solely for transfer to or from a marine worksite in a marine-hoisted personnel transfer device. (See §36-23-42.31.16. for requirements for hoisting these employees.)

42.31.3.b.4. In storage-tank (steel or concrete), shaft and chimney operations. (See §36-23-42.31.17. for requirements for hoisting these employees.)

#### 42.31.4. Equipment set-up.

42.31.4.a. The equipment must be uniformly level, within one (1) percent of level grade, and located on footing that a qualified person has determined to be sufficiently firm and stable.

42.31.4.b. Equipment with outriggers or stabilizers must have them all extended and locked. The amount of extension must be the same for all outriggers and stabilizers and in accordance with manufacturer procedures and load charts.

#### 42.31.5. Equipment criteria.

42.31.5.a. Capacity: Use of suspended personnel platforms. The total load (with the platform loaded, including the hook, load line and rigging) must not exceed fifty (50) percent of the rated capacity for the radius and configuration of the equipment, except during proof testing.

42.31.5.b. Capacity: Use of boom-attached personnel platforms. The total weight of the loaded personnel platform must not exceed fifty (50) percent of the rated capacity for the radius and configuration of the equipment (except during proof testing).

42.31.5.c. Capacity: Hoisting personnel without a personnel platform. When hoisting personnel without a personnel platform pursuant to §36-23-42.31.3.b. (exceptions), the total load (including the hook, load line, rigging and any other equipment that imposes a load) must not exceed fifty (50) percent of the rated capacity for the radius and configuration of the equipment, except during proof testing.

42.31.5.d. When the occupied personnel platform is in a stationary working position, the load and boom hoist brakes, swing brakes, and operator actuated secondary braking and locking features (such as pawls or dogs) or automatic secondary brakes must be engaged.

#### 42.31.5.e. Devices.

42.31.5.e.1. Equipment (except for derricks and articulating cranes) with a variable angle boom must be equipped with all of the following:

42.31.5.e.1.A. A boom angle indicator, readily visible to the operator, and

42.31.5.e.1.B. A boom hoist limiting device.

42.31.5.e.2. Articulating cranes must be equipped with a properly functioning automatic overload protection device.

42.31.5.e.3. Equipment with a luffing jib must be equipped with:

42.31.5.e.3.A. A jib angle indicator, readily visible to the operator, and.

42.31.5.e.3.B. A jib hoist limiting device.

42.31.5.e.4. Equipment with telescoping booms must be equipped with a device to indicate the boom's extended length clearly to the operator, or must have measuring marks on the boom.

42.31.5.e.5. Anti two-block. A device which automatically prevents damage and load failure from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component) must be used. The device(s) must prevent such damage/failure at all points where two-blocking could occur. Exception: This device is not required when hoisting personnel in pile driving operations. Instead, §36-23-42.17.4.c. specifies how to prevent two-blocking during such operations.

42.31.5.e.6. Controlled load lowering. The load line hoist drum must have a system, other than the load line hoist brake, which regulates the lowering rate of speed of the hoist mechanism. This system or device must be used when hoisting personnel.

42.31.5.e.6.A. Note: Free fall of the load line hoist is prohibited (see §36-23-42.27.4.) the use of equipment in which the boom hoist mechanism can free fall is also prohibited (see §36-23-42.27.1.a.).

42.31.5.e.7. Proper operation required. Personnel hoisting operations must not begin unless the devices listed in this Subdivision are in proper working order. If a device stops working properly during such operations, the operator must safely stop operations. Personnel hoisting operations must not resume until the device is again working properly. Alternative measures are not permitted. (See §36-23-42.18. for tag-out and related requirements.)

42.31.5.f. Direct attachment of a personnel platform to a luffing jib is prohibited.

42.31.6. Personnel platform criteria.

42.31.6.a. A qualified person familiar with structural design must design the personnel platform and attachment/suspension system used for hoisting personnel.

42.31.6.b. The system used to connect the personnel platform to the equipment must allow the platform to remain within ten (10) degrees of level, regardless of boom angle.

42.31.6.c. The suspension system must be designed to minimize tipping of the platform due to movement of employees occupying the platform.

42.31.6.d. The personnel platform itself (excluding the guardrail system and personal fall arrest system anchorages), must be capable of supporting, without failure, its own weight and at least five (5) times the maximum intended load.

42.31.6.e. All welding of the personnel platform and its components must be performed by a certified welder familiar with the weld grades, types and material specified in the platform design.

42.31.6.f. The personnel platform must be equipped with a guardrail system which meets the

requirements of §36-23-41., and must be enclosed at least from the toeboard to mid-rail with either solid construction material or expanded metal having openings no greater than one-half (1/2) inch. Points to which personal fall arrest systems are attached must meet the anchorage requirements in §36-23-41.

42.31.6.g. A grab rail must be installed inside the entire perimeter of the personnel platform except for access gates/doors.

42.31.6.h. Access gates/doors. If installed, access gates/doors of all types (including swinging, sliding, folding, or other types) must:

42.31.6.h.1. Not swing outward. If due to the size of the personnel platform, such as a one (1) person platform, it is infeasible for the door to swing inward and allow safe entry for the platform occupant, then the access gate/door may swing outward.

42.31.6.h.2. Be equipped with a device that prevents accidental opening.

42.31.6.i. Headroom must be sufficient to allow employees to stand upright in the platform.

42.31.6.i. In addition to the use of hard hats, employees must be protected by overhead protection on the personnel platform when employees are exposed to falling objects. The platform overhead protection must not obscure the view of the operator or platform occupants (such as wire mesh that has up to one-half (1/2) inch openings), unless full protection is necessary.

42.31.6.k. All edges exposed to employee contact must be smooth enough to prevent injury.

42.31.6.l. The weight of the platform and its rated capacity must be conspicuously posted on the platform with a plate or other permanent marking.

42.31.7. Personnel platform loading.

42.31.7.a. The personnel platform must not be loaded in excess of its rated capacity.

42.31.7.b. Use.

42.31.7.b.1. Personnel platforms must be used only for employees, their tools, and the materials necessary to do their work. Platforms must not be used to hoist materials or tools when not hoisting personnel.

42.31.7.b.2. Exception: Materials and tools to be used during the lift, if secured and distributed in accordance with §36-23-42.31.7.c. may be in the platform for trial lifts.

42.31.7.c. Materials and tools must be:

42.31.7.c.1. Secured to prevent displacement.

42.31.7.c.2. Evenly distributed within the confines of the platform while it is suspended.

42.31.7.d. The number of employees occupying the personnel platform must not exceed the maximum number the platform was designed to hold or the number required to perform the work, whichever is less.

42.31.8. Attachment and rigging.

42.31.8.a. Hooks and other detachable devices.

42.31.8.a.1. Hooks used in the connection between the hoist line and the personnel platform (including hooks on overhaul ball assemblies, lower load blocks, bridle legs, or other attachment assemblies or components) must be:

42.31.8.a.1.A. Of a type that can be closed and locked, eliminating the throat opening.

42.31.8.a.1.B. Closed and locked when attached.

42.31.8.a.2. Shackles used in place of hooks must be of the alloy anchor type, with either:

42.31.8.a.2.A. A bolt, nut and retaining pin, in place; or

42.31.8.a.2.B. Of the screw type, with the screw pin secured from accidental removal.

42.31.8.a.3. Where other detachable devices are used, they must be of the type that can be closed and locked to the same extent as the devices addressed in §§36-23-42.31.8.a.1. and 36-23-42.31.8.a.2. Such devices must be closed and locked when attached.

42.31.8.b. Rope bridle. When a rope bridle is used to suspend the personnel platform, each bridle leg must be connected to a master link or shackle (see §36-23-42.31.8.a.) in a manner that ensures that the load is evenly divided among the bridle legs.

42.31.8.c. Rigging hardware (including wire rope, shackles, rings, master links, and other rigging hardware) and hooks must be capable of supporting, without failure, at least five (5) times the maximum intended load applied or transmitted to that component. Where rotation resistant rope is used, the slings must be capable of supporting without failure at least ten (10) times the maximum intended load.

42.31.8.d. Eyes in wire rope slings must be fabricated with thimbles.

42.31.8.e. Bridles and associated rigging for suspending the personnel platform must be used only for the platform and the necessary employees, their tools and materials necessary to do their work. The bridles and associated rigging must not have been used for any purpose other than hoisting personnel.

42.31.9. Trial lift and inspection.

42.31.9.a. A trial lift with the unoccupied personnel platform loaded at least to the anticipated lightweight must be made from ground level, or any other location where employees will enter the platform, to each location at which the platform is to be hoisted and positioned. Where there is more than one (1) location to be reached from a single set-up position, either individual trial lifts for each location, or a single trial lift, in which the platform is moved sequentially to each location, must be performed; the method selected must be the same as the method that will be used to hoist the personnel.

42.31.9.b. The trial lift must be performed immediately prior to each shift in which personnel will be hoisted. In addition, the trial lift must be repeated prior to hoisting employees in each of the following circumstances:

42.31.9.b.1. The equipment is moved and set up in a new location or returned to a previously used location.

42.31.9.b.2. The lift route is changed, unless the competent person determines that the new route presents no new factors affecting safety.

42.31.9.c. The competent person must determine that:

42.31.9.c.1. Safety devices and operational aids required by this Section are activated and functioning properly. Other safety devices and operational aids must meet the requirements of §§36-23-42.16. and 36-23-42.17.

42.31.9.c.2. Nothing interferes with the equipment or the personnel platform in the course of the trial lift.

42.31.9.c.3. The lift will not exceed fifty (50) percent of the equipment's rated capacity at any time during the lift.

42.31.9.c.4. The load radius to be used during the lift has been accurately determined.

42.31.9.d. Immediately after the trial lift, the competent person must:

42.31.9.d.1. Conduct a visual inspection of the equipment, base support or ground, and personnel platform, to determine whether the trial lift has exposed any defect or problem or produced any adverse effect.

42.31.9.d.2. Confirm that, upon the completion of the trial lift process, the test weight has been removed.

42.31.9.e. Immediately prior to each lift:

42.31.9.e.1. The platform must be hoisted a few inches with the personnel and materials/tools on board and inspected by a competent person to ensure that it is secure and properly balanced.

42.31.9.e.2. The following conditions must be determined by a competent person to exist before the lift of personnel proceeds:

42.31.9.e.2.A. Hoist ropes must be free of deficiencies in accordance with §36-23-42.14.1.

42.31.9.e.2.B. Multiple part lines must not be twisted around each other.

42.31.9.e.2.C. The primary attachment must be centered over the platform.

42.31.9.e.2.D. If the load rope is slack, the hoisting system must be inspected to ensure that all ropes are properly seated on drums and in sheaves.

42.31.9.f. Any condition found during the trial lift and subsequent inspection(s) that fails to meet a requirement of this standard or otherwise creates a safety hazard must be corrected before hoisting personnel. (See §36-23-42.18. for tag-out and related requirements.)

42.31.10. Proof testing.

42.31.10.a. At each jobsite, prior to hoisting employees on the personnel platform, and after any repair or modification, the platform and rigging must be proof tested to one hundred twenty-five (125) percent of the platform's rated capacity. The proof test may be done concurrently with the trial lift.

42.31.10.b. The platform must be lowered by controlled load lowering, braked, and held in a suspended position for a minimum of five (5) minutes with the test load evenly distributed on the platform.

42.31.10.c. After proof testing, a competent person must inspect the platform and rigging to determine if the test has been passed. If any deficiencies are found that pose a safety hazard, the platform and rigging must not be used to hoist personnel unless the deficiencies are corrected, the test is repeated, and a competent person determines that the test has been passed. (See §36-23-42.18. for tag-out and related requirements.)

42.31.10.d. Personnel hoisting must not be conducted until the competent person determines that the platform and rigging have successfully passed the proof test.

42.31.11. Work practices.

42.31.11.a. Hoisting of the personnel platform must be performed in a slow, controlled, cautious manner, with no sudden movements of the equipment or the platform.

42.31.11.b. Platform occupants must:

42.31.11.b.1. Keep all parts of the body inside the platform during raising, lowering, and horizontal movement. This provision does not apply to an occupant of the platform when necessary to position the platform or while performing the duties of a signal person.

42.31.11.b.2. Not stand, sit on, or work from the top or intermediate rail or toeboard, or use any other means/device to raise their working height.

42.31.11.b.3. Not pull the platform out of plumb in relation to the hoisting equipment.

42.31.11.c. Before employees exit or enter a hoisted personnel platform that is not landed, the platform must be secured to the structure where the work is to be performed, unless the employer can demonstrate that securing to the structure would create a greater hazard.

42.31.11.d. If the platform is tied to the structure, the operator must not move the platform until the operator receives confirmation that it is freely suspended.

42.31.11.e. Tag lines must be used when necessary to control the platform.

42.31.11.f. Platforms without controls. Where the platform is not equipped with controls, the equipment operator must remain at the equipment controls, on site, and in view of the equipment, at all times while the platform is occupied.

42.31.11.g. Platforms with controls. Where the platform is equipped with controls, all of the following must be met at all times while the platform is occupied:

42.31.11.g.1. The occupant using the controls in the platform must be a qualified person with respect to their use, including the safe limitations of the equipment and hazards associated with its operation.

42.31.11.g.2. The equipment operator must be at a set of equipment controls that include boom and swing functions of the equipment, and must be on site and in view of the equipment.

42.31.11.g.3. The platform operating manual must be in the platform or on the equipment.

42.31.11.h. Environmental conditions.

42.31.11.h.1. Wind. When wind speed (sustained or gusts) exceeds twenty (20) mph at the personnel platform, a qualified person must determine if, in light of the wind conditions, it is not safe to lift personnel. If it is not, the lifting operation must not begin (or, if already in progress, must be terminated).

42.31.11.h.2. Other weather and environmental conditions. A qualified person must determine if, in light of indications of dangerous weather conditions, or other impending or existing danger, it is not safe to lift personnel. If it is not, the lifting operation must not begin (or, if already in progress, must be terminated).

42.31.11.i. Employees being hoisted must remain in direct communication with the signal person (where used), or the operator.

42.31.11.j. Fall protection.

42.31.11.i.1. Except over water, employees occupying the personnel platform must be

provided and use a personal fall arrest system. The system must be attached to a structural member within the personnel platform. When working over or near water, the following requirements shall apply:

42.31.11.i.1.A. Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard-approved life jacket or buoyant work vests.

42.31.11.i.1.B. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall not be used.

42.31.11.i.1.C. Ring buoys with at least ninety (90) feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed two hundred (200) feet.

42.31.11.i.1.D. At least one (1) lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.

42.31.11.i.2. The fall arrest system, including the attachment point (anchorage) used to comply with §36-23-42.11.i.1., must meet the requirements in §36-23-41.4.

42.31.11.k. Other load lines.

42.31.11.k.1. No lifts must be made on any other of the equipment's load lines while personnel are being hoisted, except in pile driving operations.

42.31.11.k.2. Factory-produced boom-mounted personnel platforms that incorporate a winch as original equipment. Loads are permitted to be hoisted by such a winch while employees occupy the personnel platform only where the load on the winch line does not exceed five hundred (500) pounds and does not exceed the rated capacity of the winch and platform.

42.31.11.l. Traveling -- equipment other than derricks.

42.31.11.l.1. Hoisting of employees while the equipment is traveling is prohibited, except for:

42.31.11.l.1.A. Equipment that travels on fixed rails; or

42.31.11.l.1.B. Where the employer demonstrates that there is no less hazardous way to perform the work.

42.31.11.l.1.C. This exception does not apply to rubber-tired equipment.

42.31.11.l.2. Where employees are hoisted while the equipment is traveling, all of the following criteria must be met:

42.31.11.l.2.A. Equipment travel must be restricted to a fixed track or runway.

42.31.11.l.2.B. Where a runway is used, it must be a firm, level surface designed, prepared and designated as a path of travel for the weight and configuration of the equipment being used to lift and travel with the personnel platform. An existing surface may be used as long as it meets these criteria.

42.31.11.l.2.C. Equipment travel must be limited to boom length.

42.31.11.l.2.D. The boom must be parallel to the direction of travel, except where it is safer to do otherwise.

42.31.11.l.2.E. A complete trial run must be performed to test the route of travel

before employees are allowed to occupy the platform. This trial run can be performed at the same time as the trial lift required by §36-23-42.31.9. which tests the lift route.

42.31.11.m. Traveling -- derricks. Derricks are prohibited from traveling while personnel are hoisted.

42.31.12. Pre-lift meeting. A pre-lift meeting must be:

42.31.12.a. Held to review the applicable requirements and the procedures that will be followed.

42.31.12.b. Attended by the equipment operator, signal person (if used for the lift), employees to be hoisted, and the person responsible for the task to be performed.

42.31.12.c. Held prior to the trial lift at each new work location, and must be repeated for any employees newly assigned to the operation.

42.31.13. Hoisting personnel near power lines. Hoisting personnel within twenty (20) feet of a power line that is up to 350 kV, and hoisting personnel within fifty (50) feet of a power line that is over 350 kV, is prohibited, except for work covered by OSHA §1926 Subpart V (Power Transmission and Distribution).

42.31.14. Hoisting personnel in drill shafts. When hoisting employees into and out of drill shafts that are up to and including eight (8) feet in diameter, all of the following requirements must be met:

42.31.14.a. The employee must be in either a personnel platform or on a boatswain's chair.

42.31.14.b. If using a personnel platform, §§36-23-42.31.2. through 36-23-42.31.13. apply.

42.31.14.c. If using a boatswain's chair:

42.31.14.c.1. The following citations apply: §§36-23-42.31.2., 36-23-42.31.4., 36-23-42.31.5.a., 36-23-42.31.5.c., 36-23-42.31.5.d., 36-23-42.31.6.a., 36-23-42.31.6.b., 36-23-42.31.6.c., 36-23-42.31.7.a., 36-23-42.31.7.b.1., 36-23-42.31.7.c.1., 36-23-42.31.8., 36-23-42.31.9., 36-23-42.31.11.a., 36-23-42.31.11.f., 36-23-42.31.11.h., 36-23-42.31.11.i., 36-23-42.31.11.k.1., 36-23-42.31.12., and 36-23-42.31.13. Where the terms "personnel platform" or "platform" are used in these citations, substitute them with "boatswain's chair."

42.31.14.c.2. A signal person must be stationed at the shaft opening.

42.31.14.c.3. The employee must be hoisted in a slow, controlled descent and ascent.

42.31.14.c.4. The employee must use personal fall protection equipment, including a full body harness, attached independent of the crane/derrick.

42.31.14.c.5. The fall protection equipment must meet the applicable requirements in §36-23-42.4.

42.31.14.c.6. The boatswain's chair itself (excluding the personal fall arrest system anchorages), must be capable of supporting, without failure, its own weight and at least five (5) times the maximum intended load.

42.31.14.c.7. No more than one (1) person must be hoisted at a time.

42.31.15. Hoisting personnel for pile driving operations. When hoisting an employee in pile driving operations, the following requirements must be met:

42.31.15.a. The employee must be in a personnel platform or boatswain's chair.

42.31.15.b. For lattice boom cranes: Clearly mark the cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached. For telescopic boom cranes: Clearly mark the cable (so that it can be easily seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, and use a spotter who is in direct communication with the operator to inform the operator when this point is reached.

42.31.15.c. If using a personnel platform, §§36-23-42.31.3. through 36-23-42.31.13. apply.

42.31.15.d. If using a boatswain's chair:

42.31.15.d.1. The following citations apply: §§36-23-42.31.2., 36-23-42.31.4., 36-23-42.31.5.a., 36-23-42.31.5.c., 36-23-42.31.5.d., 36-23-42.31.6.a., 36-23-42.31.6.b., 36-23-42.31.6.c., 36-23-42.31.7.a., 36-23-42.31.7.b.1., 36-23-42.31.7.c.1., 36-23-42.31.8., 36-23-42.31.9., 36-23-42.31.10., 36-23-42.31.11.a., 36-23-42.31.11.f., 36-23-42.31.11.h., 36-23-42.31.11.i., 36-23-42.31.11.k.1., 36-23-42.31.12., and 36-23-42.31.13. Where the terms "personnel platform" or "platform" are used in these citations, substitute them with "boatswain's chair."

42.31.15.d.2. The employee must be hoisted in a slow, controlled descent and ascent.

42.31.15.d.3. The employee must use personal fall protection equipment, including a full body harness, independently attached to the lower load block or overhaul ball.

42.31.15.d.4. The fall protection equipment must meet the applicable requirements in §36-23-42.4.

42.31.15.d.5. The boatswain's chair itself (excluding the personal fall arrest system anchorages), must be capable of supporting, without failure, its own weight and at least five (5) times the maximum intended load.

42.31.15.d.6. No more than one person must be hoisted at a time.

42.31.16. Hoisting personnel for marine transfer. When hoisting employees solely for transfer to or from a marine worksite, the following requirements must be met:

42.31.16.a. The employee must be in either a personnel platform or a marine-hoisted personnel transfer device.

42.31.16.b. If using a personnel platform, §§36-23-42.31.2. through 36-23-42.31.13. apply.

42.31.16.c. If using a marine-hoisted personnel transfer device:

42.31.16.c.1. The following citations apply: §§36-23-42.31.2., 36-23-42.31.4.b., 36-23-42.31.5.a., 36-23-42.31.5.c., 36-23-42.31.5.d., 36-23-42.31.6.a. through 36-23-42.31.6.e., 36-23-42.31.6.l., 36-23-42.31.7.a., 36-23-42.31.8., 36-23-42.31.9., 36-23-42.31.10., 36-23-42.31.11.a., 36-23-42.31.11.h., 36-23-42.31.11.i., 36-23-42.31.11.j.2., 36-23-42.31.11.k.1., 36-23-42.31.11.l., 36-23-42.31.12., and 36-23-42.31.13. Where the terms "personnel platform" or "platform" are used in these citations, substitute them with "marine-hoisted personnel transfer device."

42.31.16.c.2. The transfer device must be used only for transferring workers.

42.31.16.c.3. The number of workers occupying the transfer device must not exceed the maximum number it was designed to hold.

42.31.16.c.4. Each employee must wear a U.S. Coast Guard personal flotation device approved for industrial use.

42.31.17. Hoisting personnel for storage-tank (steel or concrete), shaft and chimney operations. When hoisting an employee in storage tank (steel or concrete), shaft and chimney operations, the following requirements must be met:

42.31.17.a. The employee must be in a personnel platform except when the employer can demonstrate that use of a personnel platform is infeasible; in such a case, a boatswain's chair must be used.

42.31.17.b. If using a personnel platform, Subsections §§36-23-42.31.2. through 36-23-42.31.13. apply.

42.31.17.c. If using a boatswain's chair:

42.31.17.c.1. The following citations apply: §§36-23-42.31.2., 36-23-42.31.4., 36-23-42.31.5.a., 36-23-42.31.5.c., 36-23-42.31.5.d., 36-23-42.31.6.a., 36-23-42.31.6.b., 36-23-42.31.6.c., 36-23-42.31.7.a., 36-23-42.31.7.b.1., 36-23-42.31.7.c.1., 36-23-42.31.8., 36-23-42.31.9., 36-23-42.31.11.a., 36-23-42.31.11.f., 36-23-42.31.11.h., 36-23-42.31.11.i., 36-23-42.31.11.k.1., 36-23-42.31.12., and 36-23-42.31.13. Where the terms "personnel platform" or "platform" are used in these citations, substitute them with "boatswain's chair."

42.31.17.c.2. The employee must be hoisted in a slow, controlled descent and ascent.

42.31.17.c.3. The employee must use personal fall protection equipment, including a full body harness, attached independent of the crane/derrick. When there is no adequate structure for attachment of personal fall arrest equipment as required in §36-23-42.4., the attachment must be to the lower load block or overhaul ball.

42.31.17.c.4. The fall protection equipment must meet the applicable requirements in §36-23-42.4.

42.31.17.c.5. The boatswain's chair itself (excluding the personal fall arrest system anchorages), must be capable of supporting, without failure, its own weight and at least five (5) times the maximum intended load.

42.31.17.c.6. No more than one (1) person must be hoisted at a time.

42.32. Multiple-crane/derrick lifts. Supplemental requirements.

42.32.1. Plan development. Before beginning a crane/derrick operation in which more than one (1) crane/derrick will be supporting the load, the operation must be planned. The planning must meet the following requirements:

42.32.1.a. The plan must be developed by a qualified person.

42.32.1.b. The plan must be designed to ensure that the requirements of this Section are met.

42.32.1.c. Where the qualified person determines that engineering expertise is needed for the planning, the employer must ensure that it is provided.

42.32.2. Plan implementation.

42.32.2.a. The multiple-crane/derrick lift must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one (1) or more qualified persons (lift director).

42.32.2.b. The lift director must review the plan in a meeting with all workers who will be involved with the operation.

42.33. Design, construction and testing.

42.33.1. The following requirements apply to equipment that has a manufacturer-rated hoisting/lifting capacity of more than two thousand (2,000) pounds.

42.33.2. Crawler, truck and locomotive cranes manufactured prior to November 8, 2010 must meet the applicable requirements for design, construction, and testing as prescribed in ANSI B30.5-1968 (incorporated by reference, see OSHA §1926.6), PCSA Std. No. 2 (1968) (incorporated by reference, see OSHA §1926.6), the requirements in §36-23-42.33.3., or the applicable DIN standards that were in effect at the time of manufacture.

42.33.3. Mobile (including crawler and truck) and locomotive cranes manufactured on or after November 8, 2010 must meet the following portions of ASME B30.5-2004 (incorporated by reference, see OSHA §1926.6) as applicable:

42.33.3.a. In section 5-1.1.1 ("Load Ratings--Where Stability Governs Lifting Performance"), paragraphs (a)--(d) (including subparagraphs).

42.33.3.b. In section 5-1.1.2 ("Load Ratings--Where Structural Competence Governs Lifting Performance"), paragraph (b).

42.33.3.c. Section 5-1.2 ("Stability (Backward and Forward)").

42.33.3.d. In section 5-1.3.1 ("Boom Hoist Mechanism"), paragraphs (a), (b)(1) and (b)(2), except that when using rotation resistant rope, OSHA §1926.1414(e)(4)(ii)(A) applies.

42.33.3.e. In section 5-1.3.2 ("Load Hoist Mechanism"), paragraphs (a)(2) through (a)(4) (including subparagraphs), (b) (including subparagraphs), (c) (first sentence only) and (d).

42.33.3.f. Section 5-1.3.3 ("Telescoping Boom").

42.33.3.g. Section 5-1.4 ("Swing Mechanism").

42.33.3.h. In section 5-1.5 ("Crane Travel"), all provisions except 5-1.5.3(d).

42.33.3.i. In section 5-1.6 ("Controls"), all provisions except 5-1.6.1(c).

42.33.3.j. Section 5-1.7.4 ("Sheaves").

42.33.3.k. Section 5-1.7.5 ("Sheave sizes").

42.33.3.l. In section 5-1.9.1 ("Booms"), paragraph (f).

42.33.3.m. Section 5-1.9.3 ("Outriggers").

42.33.3.n. Section 5-1.9.4 ("Locomotive Crane Equipment").

42.33.3.o. Section 5-1.9.7 ("Clutch and Brake Protection").

42.33.3.p. In section 5-1.9.11 ("Miscellaneous equipment"), paragraphs (a), (c), (e), and (f).

42.33.4. Prototype testing: mobile (including crawler and truck) and locomotive cranes manufactured on or after November 8, 2010 must meet the prototype testing requirements in Test Option A or Test Option B of this Subsection. Tower cranes manufactured on or after November 8, 2010 must meet the prototype testing requirements in BS EN 14439:2006 (incorporated by reference, see OSHA §1926.6). Note: Prototype testing of crawler, locomotive and truck cranes manufactured prior to November 8, 2010 must conform to §36-23-42.33.2.

42.33.4.a. Test Option A.

42.33.4.a.1. The following applies to equipment with cantilevered booms (such as hydraulic boom cranes): All the tests listed in SAE J1063 (Nov. 1993) Table 1 (incorporated by reference, see OSHA §1926.6) must be performed to load all critical structural elements to their respective limits. All the strength margins listed in SAE J1063 (Nov. 1993) Table 2 (incorporated by reference, see OSHA §1926.6) must be met.

42.33.4.a.2. The following applies to equipment with pendant supported lattice booms: All the tests listed in SAE J987 (Jun. 2003) Table 1 (incorporated by reference, see OSHA §1926.6) must be performed to load all critical structural elements to their respective limits. All the strength margins listed in SAE J987 (Jun. 2003) Table 2 (incorporated by reference, see OSHA §1926.6) must be met.

42.33.4.b. Test Option B. The testing and verification requirements of BS EN 13000:2004 (incorporated by reference, see OSHA §1926.6) must be met. In applying BS EN 13000:2004, the following additional requirements must be met:

42.33.4.b.1. The following applies to equipment with cantilevered booms (such as hydraulic boom cranes): The analysis methodology (computer modeling) must demonstrate that all load cases listed in SAE J1063 (Nov. 1993) (incorporated by reference, see OSHA §1926.6) meet the strength margins listed in SAE J1063 (Nov. 1993) Table 2.

42.33.4.b.2. The following applies to equipment with pendant supported lattice booms: The analysis methodology (computer modeling) must demonstrate that all load cases listed in SAE J987 (Jun. 2003) (incorporated by reference, see OSHA §1926.6) meet the strength margins listed in SAE J987 (Jun. 2003) Table 2.

42.33.4.b.3. Analysis verification. The physical testing requirements under SAE J1063 (Nov. 1993) (incorporated by reference, see OSHA §1926.6) and SAE J987 (Jun. 2003) (incorporated by reference, see OSHA §1926.6) must be met unless the reliability of the analysis methodology (computer modeling) has been demonstrated by a documented history of verification through strain gauge measuring or strain gauge measuring in combination with other physical testing.

42.33.5. All equipment covered by this Section must meet the following requirements:

42.33.5.a. Rated capacity and related information. The information available in the cab (see §36-23-42.18.3.) regarding “rated capacity” and related information must include, at a minimum, the following information:

42.33.5.a.1. A complete range of the manufacturer’s equipment rated capacities, as follows:

42.33.5.a.1.A. At all manufacturer approved operating radii, boom angles, work areas, boom lengths and configurations, jib lengths and angles (or offset).

42.33.5.a.1.B. Alternate ratings for use and nonuse of option equipment which affects rated capacities, such as outriggers, stabilizers, and extra counterweights.

42.33.5.a.2. A work area chart for which capacities are listed in the load chart. (Note: An example of this type of chart is in ASME B30.5-2004, section 5-1.1.3, Figure 11).

42.33.5.a.3. The work area figure and load chart must clearly indicate the areas where no load is to be handled.

42.33.5.a.4. Recommended reeving for the hoist lines must be shown.

42.33.5.a.5. Recommended parts of hoist reeving, size, and type of wire rope for various equipment loads.

42.33.5.a.6. Recommended boom hoist reeving diagram, where applicable; size, type and length of wire rope.

42.33.5.a.7. Tire pressure (where applicable).

42.33.5.a.8. Caution or warnings relative to limitations on equipment and operating procedures, including an indication of the least stable direction.

42.33.5.a.9. Position of the gantry and requirements for intermediate boom suspension (where applicable).

42.33.5.a.10. Instructions for boom erection and conditions under which the boom, or boom and jib combinations, may be raised or lowered.

42.33.5.a.11. Whether the hoist holding mechanism is automatically or manually controlled, whether free fall is available, or any combination of these.

42.33.5.a.12. The maximum telescopic travel length of each boom telescopic section.

42.33.5.a.13. Whether sections are telescoped manually or with power.

42.33.5.a.14. The sequence and procedure for extending and retracting the telescopic boom section.

42.33.5.a.15. Maximum loads permitted during the boom extending operation, and any limiting conditions or cautions.

42.33.5.a.16. Hydraulic relief valve settings specified by the manufacturer.

42.33.5.b. Load hooks (including latched and unlatched types), ball assemblies and load blocks must be of sufficient weight to overhaul the line from the highest hook position for boom or boom and jib lengths and the number of parts of the line in use.

42.33.5.c. Hook and ball assemblies and load blocks must be marked with their rated capacity and weight.

42.33.5.d. Latching hooks.

42.33.5.d.1. Hooks must be equipped with latches, except where the requirements of §36-23-42.33.5.d.2. are met.

42.33.5.d.2. Hooks without latches, or with latches removed or disabled, must not be used unless:

42.33.5.d.2.A. A qualified person has determined that it is safer to hoist and place the load without latches (or with the latches removed/tied-back).

42.33.5.d.2.B. Routes for the loads are pre-planned to ensure that no employee is required to work in the fall zone except for employees necessary for the hooking or unhooking of the load.

42.33.5.d.3. The latch must close the throat opening and be designed to retain slings or other lifting devices/accessories in the hook when the rigging apparatus is slack.

42.33.5.e. Posted warnings. Posted warnings required by this Section as well as those originally supplied with the equipment by the manufacturer must be maintained in legible condition.

42.33.5.f. An accessible fire extinguisher must be on the equipment.

42.33.5.g. Cabs. Equipment with cabs must meet the following requirements:

42.33.5.g.1. Cabs must be designed with a form of adjustable ventilation and method for clearing the windshield for maintaining visibility and air circulation. Examples of means for adjustable ventilation include air conditioner or window that can be opened (for ventilation and air circulation); examples of means for maintaining visibility include heater (for preventing windshield icing), defroster, fan, windshield wiper.

42.33.5.g.2. Cab doors (swinging, sliding) must be designed to prevent inadvertent opening or closing while traveling or operating the machine. Swinging doors adjacent to the operator must open outward. Sliding operator doors must open rearward.

42.33.5.g.3. Windows.

42.33.5.g.3.A. The cab must have windows in front and on both sides of the operator. Forward vertical visibility must be sufficient to give the operator a view of the boom point at all times.

42.33.5.g.3.B. Windows may have sections designed to be opened or readily removed. Windows with sections designed to be opened must be designed so that they can be secured to prevent inadvertent closure.

42.33.5.g.3.C. Windows must be of safety glass or material with similar optical and safety properties, that introduce no visible distortion or otherwise obscure visibility that interferes with the safe operation of the equipment.

42.33.5.g.4. A clear passageway must be provided from the operator's station to an exit door on the operator's side.

42.33.5.g.5. Areas of the cab roof that serve as a workstation for rigging, maintenance or other equipment-related tasks must be capable of supporting two hundred (250) pounds without permanent distortion.

42.33.5.h. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, and other parts or components that reciprocate, rotate or otherwise move must be guarded where contact by employees (except for maintenance and repair employees) is possible in the performance of normal duties.

42.33.5.i. All exhaust pipes, turbochargers, and charge air coolers must be insulated or guarded where contact by employees (except for maintenance and repair employees) is possible in the performance of normal duties.

42.33.5.i. Hydraulic and pneumatic lines must be protected from damage to the extent feasible.

42.33.5.k. The equipment must be designed so that exhaust fumes are not discharged in the cab and are discharged in a direction away from the operator.

42.33.5.l. Friction mechanisms. Where friction mechanisms (such as brakes and clutches) are used to control the boom hoist or load line hoist, they must be:

42.33.5.l.1. Of a size and thermal capacity sufficient to control all rated loads with the minimum recommended reeving.

42.33.5.l.2. Adjustable to permit compensation for lining wear to maintain proper operation.

42.33.5.m. Hydraulic load hoists. Hydraulic drums must have an integrally mounted holding device or internal static brake to prevent load hoist movement in the event of hydraulic failure.

42.33.6. The employer's obligations under §§36-23-42.33.2. through 36-23-42.33.4. and §§36-23-42.33.5.g. through 36-23-42.33.4.m. are met where the equipment has not changed (except in accordance with §36-23-42.34. (equipment modifications)) and it can refer to documentation from the manufacturer showing that the equipment has been designed, constructed and tested in accordance with those citations.

42.34. Equipment modifications.

42.34.1. Modifications or additions which affect the capacity or safe operation of the equipment are prohibited except where the requirements of §§36-23-42.34.1.a., 36-23-42.34.1.b., 36-23-42.34.1.c., 36-23-42.34.1.d., or 36-23-42.34.1.e. are met.

42.34.1.a. Manufacturer review and approval.

42.34.1.a.1. The manufacturer approves the modifications/additions in writing.

42.34.1.a.2. The load charts, procedures, instruction manuals and instruction plates/tags/decals are modified as necessary to accord with the modification/addition.

42.34.1.a.3. The original safety factor of the equipment is not reduced.

42.34.1.b. Manufacturer refusal to review request. The manufacturer is provided a detailed description of the proposed modification/addition, is asked to approve the modification/addition, but it declines to review the technical merits of the proposal or fails, within thirty (30) days, to acknowledge the request or initiate the review, and all of the following are met:

42.34.1.b.1. A registered professional engineer who is a qualified person with respect to the equipment involved:

42.34.1.b.1.A. Approves the modification/addition and specifies the equipment configurations to which that approval applies, and

42.34.1.b.1.B. Modifies load charts, procedures, instruction manuals and instruction plates/tags/decals as necessary to accord with the modification/addition.

42.34.1.b.2. The original safety factor of the equipment is not reduced.

42.34.1.c. Unavailable manufacturer. The manufacturer is unavailable and the requirements of §§36-23-42.34.1.b.1. and 36-23-42.1.b.2. are met.

42.34.1.d. Manufacturer does not complete the review within one hundred twenty (120) days of the request. The manufacturer is provided a detailed description of the proposed modification/addition, is asked to approve the modification/addition, agrees to review the technical merits of the proposal, but fails to complete the review of the proposal within one hundred twenty (120) days of the date it was provided the detailed description of the proposed modification/addition, and the requirements of §§36-23-42.34.1.b.1. and 36-23-42.1.b.2. are met.

42.34.1.e. Multiple manufacturers of equipment designed for use on marine work sites. The equipment is designed for marine work sites, contains major structural components from more than one manufacturer, and the requirements of §§36-23-42.34.1.b.1. and 36-23-42.1.b.2. are met.

42.34.2. Modifications or additions which affect the capacity or safe operation of the equipment are prohibited where the manufacturer, after a review of the technical safety merits of the proposed modification/addition, rejects the proposal and explains the reasons for the rejection in a written response. If the manufacturer rejects the proposal but does not explain the reasons for the rejection in writing, the employer may treat this as a manufacturer refusal to review the request under §36-23-42.34.1.b.

42.34.3. The provisions in §§36-23-42.34.1. and 36-23-42.34.2. do not apply to modifications made or approved by the U.S. military.

42.35. Tower cranes.

42.35.1. This Section contains supplemental requirements for tower cranes; all requirements of this Section apply to tower cranes unless specified otherwise.

42.35.2. Erecting, climbing and dismantling.

42.35.2.a. Sections 36-23-42.4. (assembly/disassembly--selection of manufacturer or employer procedures), 36-23-42.5. (assembly/disassembly--general requirements (applies to all assembly and disassembly operations)), 36-23-42.6. (disassembly--additional requirements for dismantling of booms and jibs (applies to both the use of manufacturer procedures and employer procedures)), and 36-23-42.7. (assembly/disassembly--employer procedures--general requirements), apply to tower cranes (except as otherwise specified), except that the term "assembly/disassembly" is replaced by "erecting, climbing and dismantling," and the term "disassembly" is replaced by "dismantling."

42.35.2.b. Dangerous areas (self-erecting tower cranes). In addition to the requirements in §36-23-42.5.5., for self-erecting tower cranes, the following applies: Employees must not be in or under the tower, jib, or rotating portion of the crane during erecting, climbing and dismantling operations until the crane is secured in a locked position and the competent person in charge indicates it is safe to enter this area, unless the manufacturer's instructions direct otherwise and only the necessary personnel are permitted in this area.

42.35.2.c. Foundations and structural supports. Tower crane foundations and structural supports (including both the portions of the structure used for support and the means of attachment) must be designed by the manufacturer or a registered professional engineer.

42.35.2.d. Addressing specific hazards. The requirements in §36-23-42.5.8.a. through 36-23-42.5.8.i. apply. In addition, the A/D director must address the following:

42.35.2.d.1. Foundations and structural supports. The A/D director must determine that tower crane foundations and structural supports are installed in accordance with their design.

42.35.2.d.2. Loss of backward stability. Backward stability before swinging self erecting cranes or cranes on traveling or static undercarriages.

42.35.2.d.3. Wind speed. Wind must not exceed the speed recommended by the manufacturer or, where manufacturer does not specify this information, the speed determined by a qualified person.

42.35.2.e. Plumb tolerance. Towers must be erected plumb to the manufacturer's tolerance and verified by a qualified person. Where the manufacturer does not specify plumb tolerance, the crane tower must be plumb to a tolerance of at least 1:500 (approximately one (1) inch in forty (40) feet).

42.35.2.f. Multiple tower crane jobsites. On jobsites where more than one (1) fixed jib (hammerhead) tower crane is installed, the cranes must be located such that no crane can come in contact with the structure of another crane. Cranes are permitted to pass over one another.

42.35.2.g. Climbing procedures. Prior to, and during, all climbing procedures (including inside climbing and top climbing), the employer must:

42.35.2.g.1. Comply with all manufacturer prohibitions.

42.35.2.g.2. Have a registered professional engineer verify that the host structure is strong enough to sustain the forces imposed through the braces, brace anchorages and supporting floors.

42.35.2.h. Counterweight/ballast.

42.35.2.h.1. Equipment must not be erected, dismantled or operated without the amount and position of counterweight and/or ballast in place as specified by the manufacturer or a registered professional engineer familiar with the equipment.

42.35.2.h.2. The maximum counterweight and/or ballast specified by the manufacturer or registered professional engineer familiar with the equipment must not be exceeded.

42.35.3. Signs. The size and location of signs installed on tower cranes must be in accordance with manufacturer specifications. Where these are unavailable, a registered professional engineer familiar with the type of equipment involved must approve in writing the size and location of any signs.

42.35.4. Safety devices.

42.35.4.a. Section 36-23-42.16. does not apply to tower cranes.

42.35.4.b. The following safety devices are required on all tower cranes unless otherwise specified:

42.35.4.b.1. Boom stops on luffing boom type tower cranes.

42.35.4.b.2. Jib stops on luffing boom type tower cranes if equipped with a jib attachment.

42.35.4.b.3. Travel rail end stops at both ends of travel rail.

42.35.4.b.4. Travel rail clamps on all travel bogies.

42.35.4.b.5. Integrally mounted check valves on all load supporting hydraulic cylinders.

42.35.4.b.6. Hydraulic system pressure limiting device.

42.35.4.b.7. The following brakes, which must automatically set in the event of pressure loss or power failure, are required:

42.35.4.b.7.A. A hoist brake on all hoists.

42.35.4.b.7.B. Swing brake.

42.35.4.b.7.C. Trolley brake.

42.35.4.b.7.D. Rail travel brake.

42.35.4.b.8. Deadman control or forced neutral return control (hand) levers.

42.35.4.b.9. Emergency stop switch at the operator's station.

42.35.4.b.10. Trolley end stops must be provided at both ends of travel of the trolley.

42.35.4.c. Proper operation required. Operations must not begin unless the devices listed in this section are in proper working order. If a device stops working properly during operations, the operator must safely stop operations. The equipment must be taken out of service, and operations must not resume until the device is again working properly. (See §36-23-42.18.6.) Alternative measures are not permitted to be used.

42.35.5. Operational aids.

42.35.5.a. Section 36-23-42.17. does not apply to tower cranes.

42.35.5.b. The devices listed in this Subsection (operational aids) are required on all tower cranes, unless otherwise specified.

42.35.5.c. Operations must not begin unless the operational aids are in proper working order, except where the employer meets the specified temporary alternative measures. More protective alternative measures specified by the tower crane manufacturer, if any, must be followed. (See §36-23-42.18.9. for additional requirements.)

42.35.5.d. If an operational aid stops working properly during operations, the operator must safely stop operations until the temporary alternative measures are implemented or the device is again working properly. If a replacement part is no longer available, the use of a substitute device that performs the same type of function is permitted and is not considered a modification under §36-23-42.34.

42.35.5.e. Category I operational aids and alternative measures. Operational aids listed in this paragraph that are not working properly must be repaired no later than seven (7) calendar days after the deficiency occurs. Exception: If the employer documents that it has ordered the necessary parts within seven (7) calendar days of the occurrence of the deficiency, the repair must be completed within seven (7) calendar days of receipt of the parts.

42.35.5.e.1. Trolley travel limiting device. The travel of the trolley must be restricted at both ends of the jib by a trolley travel limiting device to prevent the trolley from running into the trolley end stops. Temporary alternative measures:

42.35.5.e.1.A. Option A. The trolley rope must be marked (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the trolley prior to the end stops.

42.35.5.e.1.B. Option B. A spotter who is in direct communication with the operator must be used when operations are conducted within ten (10) feet of the outer or inner trolley end stops.

42.35.5.e.2. Boom hoist limiting device. The range of the boom must be limited at the minimum and maximum radius. Temporary alternative measures: Clearly mark the cable (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the boom hoist within the minimum and maximum boom radius, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached.

42.35.5.e.3. Anti two-blocking device. The tower crane must be equipped with a device which automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom tip (or fixed upper block or similar component). The device(s) must prevent such damage at all points where two-blocking could occur. Temporary alternative measures: Clearly mark the cable (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached.

42.35.5.e.4. Hoist drum lower limiting device. Tower cranes manufactured after November 8, 2011 must be equipped with a device that prevents the last two (2) wraps of hoist cable from being spooled off the drum. Temporary alternative measures: Mark the cable (so it can be seen by the operator) at a point that will give the operator sufficient time to stop the hoist prior to last two (2) wraps of hoist cable being spooled off the drum, or use a spotter who is in direct communication with the operator to inform the operator when this point is reached

42.35.5.e.5. Load moment limiting device. The tower crane must have a device that prevents moment overloading. Temporary alternative measures: A radius indicating device must be used (if the tower crane is not equipped with a radius indicating device, the radius must be measured to ensure the load is within the rated capacity of the crane). In addition, the weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer), or by a calculation method

recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. This information must be provided to the operator prior to the lift.

42.35.5.e.6. Hoist line pull limiting device. The capacity of the hoist must be limited to prevent overloading, including each individual gear ratio if equipped with a multiple speed hoist transmission. Temporary alternative measures: The operator must ensure that the weight of the load does not exceed the capacity of the hoist (including for each individual gear ratio if equipped with a multiple speed hoist transmission).

42.35.5.e.7. Rail travel limiting device. The travel distance in each direction must be limited to prevent the travel bogies from running into the end stops or buffers. Temporary alternative measures: A spotter who is in direct communication with the operator must be used when operations are conducted within ten (10) feet of either end of the travel rail end stops; the spotter must inform the operator of the distance of the travel bogies from the end stops or buffers.

42.35.5.e.8. Boom hoist drum positive locking device and control. The boom hoist drum must be equipped with a control that will enable the operator to positively lock the boom hoist drum from the cab. Temporary alternative measures: The device must be manually set when required if an electric, hydraulic or automatic control is not functioning.

42.35.5.f. Category II operational aids and alternative measures. Operational aids listed in this Subsection that are not working properly must be repaired no later than thirty (30) calendar days after the deficiency occurs. Exception: If the employer documents that it has ordered the necessary parts within seven (7) calendar days of the occurrence of the deficiency, and the part is not received in time to complete the repair in thirty (30) calendar days, the repair must be completed within seven (7) calendar days of receipt of the parts.

42.35.5.f.1. Boom angle or hook radius indicator.

42.35.5.f.1.A. Luffing boom tower cranes must have a boom angle indicator readable from the operator's station.

42.35.5.f.1.B. Hammerhead tower cranes manufactured after November 8, 2011 must have a hook radius indicator readable from the operator's station.

42.35.5.f.1.C. Temporary alternative measures: Hook radii or boom angle must be determined by measuring the hook radii or boom angle with a measuring device.

42.35.5.f.2. Trolley travel deceleration device. The trolley speed must be automatically reduced prior to the trolley reaching the end limit in both directions. Temporary alternative measure: The employer must post a notice in the cab of the crane notifying the operator that the trolley travel deceleration device is malfunctioning and instructing the operator to take special care to reduce the trolley speed when approaching the trolley end limits.

42.35.5.f.3. Boom hoist deceleration device. The boom speed must be automatically reduced prior to the boom reaching the minimum or maximum radius limit. Temporary alternative measure: The employer must post a notice in the cab of the crane notifying the operator that the boom hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the boom speed when approaching the minimum or maximum radius limits.

42.35.5.f.4. Load hoist deceleration device. The load speed must be automatically reduced prior to the hoist reaching the upper limit. Temporary alternative measure: The employer must post a notice in the cab of the crane notifying the operator that the load hoist deceleration device is malfunctioning and instructing the operator to take special care to reduce the load speed when

approaching the upper limits.

42.35.5.f.5. Wind speed indicator. A device must be provided to display the wind speed and must be mounted above the upper rotating structure on tower cranes. On self erecting cranes, it must be mounted at or above the jib level. Temporary alternative measures: Use of wind speed information from a properly functioning indicating device on another tower crane on the same site, or a qualified person estimates the wind speed.

42.35.5.f.6. Load indicating device. Cranes manufactured after November 8, 2011 must have a device that displays the magnitude of the load on the hook. Displays that are part of load moment limiting devices that display the load on the hook meet this requirement. Temporary alternative measures: The weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer), or by a calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. This information must be provided to the operator prior to the lift.

#### 42.35.6. Inspections.

42.35.6.a. Section 36-23-42-13. (inspections) applies to tower cranes, except that the term "assembly" is replaced by "erection." §36-23-42.14. (wire rope--inspection) applies to tower cranes.

42.35.6.b. Pre-erection inspection. Before each crane component is erected, it must be inspected by a qualified person for damage or excessive wear.

42.35.6.b.1. The qualified person must pay particular attention to components that will be difficult to inspect thoroughly during shift inspections.

42.35.6.b.2. If the qualified person determines that a component is damaged or worn to the extent that it would create a safety hazard if used on the crane, that component must not be erected on the crane unless it is repaired and, upon reinspection by the qualified person, found to no longer create a safety hazard.

42.35.6.b.3. If the qualified person determines that, although not presently a safety hazard, the component needs to be monitored, the employer must ensure that the component is checked in the monthly inspections. Any such determination must be documented, and the documentation must be available to any individual who conducts a monthly inspection.

42.35.6.c. Post-erection inspection. In addition to the requirements in §36-23-42.13.3., the following requirements must be met:

42.35.6.c.1. A load test using certified weights, or scaled weights using a certified scale with a current certificate of calibration, must be conducted after each erection.

42.35.6.c.2. The load test must be conducted in accordance with the manufacturer's instructions when available. Where these instructions are unavailable, the test must be conducted in accordance with written load test procedures developed by a registered professional engineer familiar with the type of equipment involved.

42.35.6.d. Monthly. The following additional items must be included:

42.35.6.d.1. Tower (mast) bolts and other structural bolts (for loose or dislodged condition) from the base of the tower crane up or, if the crane is tied to or braced by the structure, those above the upper-most brace support.

42.35.6.d.2. The upper-most tie-in, braces, floor supports and floor wedges where the tower crane is supported by the structure, for loose or dislodged components.

42.35.6.e. Annual. In addition to the items that must be inspected under §36-23-42.13.6., all turntable and tower bolts must be inspected for proper condition and torque.

42.36. Derricks.

42.36.1. This Section contains supplemental requirements for derricks, whether temporarily or permanently mounted; all requirements of this Section apply to derricks unless specified otherwise. A derrick is powered equipment consisting of a mast or equivalent member that is held at or near the end by guys or braces, with or without a boom, and its hoisting mechanism. The mast/equivalent member and/or the load is moved by the hoisting mechanism (typically base-mounted) and operating ropes. Derricks include: A-frame, basket, breast, Chicago boom, gin pole (except gin poles used for erection of communication towers), guy, shearleg, stiffleg, and variations of such equipment.

42.36.2. Operation--procedures.

42.36.2.a. Section 36-23-42.18. (operation) applies except for §36-23-42.18.3. (accessibility of procedures).

42.36.2.b. Load chart contents. Load charts must contain at least the following information:

42.36.2.b.1. Rated capacity at corresponding ranges of boom angle or operating radii.

42.36.2.b.2. Specific lengths of components to which the rated capacities apply.

42.36.2.b.3. Required parts for hoist reeving.

42.36.2.b.4. Size and construction of rope must be included on the load chart or in the operating manual.

42.36.2.c. Load chart location.

42.36.2.c.1. Permanent installations. For permanently installed derricks with fixed lengths of boom, guy, and mast, a load chart must be posted where it is visible to personnel responsible for the operation of the equipment.

42.36.2.c.2. Non-permanent installations. For derricks that are not permanently installed, the load chart must be readily available at the job site to personnel responsible for the operation of the equipment.

42.36.3. Construction.

42.36.3.a. General requirements.

42.36.3.a.1. Derricks must be constructed to meet all stresses imposed on members and components when installed and operated in accordance with the manufacturer's/builder's procedures and within its rated capacity.

42.36.3.a.2. Welding of load sustaining members must conform to recommended practices in ANSI/AWS D14.3-94 (incorporated by reference, see OSHA §1926.6) or AWS D1.1/D1.1M:2002 (incorporated by reference, see OSHA §1926.6).

42.36.3.b. Guy derricks.

42.36.3.b.1. The minimum number of guys must be six (6), with equal spacing, except where a qualified person or derrick manufacturer approves variations from these requirements and revises the rated capacity to compensate for such variations.

42.36.3.b.2. Guy derricks must not be used unless the employer has the following guy

information from the manufacturer or a qualified person, when not available from the manufacturer:

42.36.3.b.2.A. The number of guys.

42.36.3.b.2.B. The spacing around the mast.

42.36.3.b.2.C. The size, grade, and construction of rope to be used for each guy.

42.36.3.b.3. For guy derricks manufactured after December 18, 1970, in addition to the information required in §36-23-42.36.3.b.2., the employer must have the following guy information from the manufacturer or a qualified person, when not available from the manufacturer:

42.36.3.b.3.A. The amount of initial sag or tension.

42.36.3.b.3.B. The amount of tension in guy line rope at anchor.

42.36.3.b.4. The mast base must permit the mast to rotate freely with allowance for slight tilting of the mast caused by guy slack.

42.36.3.b.5. The mast cap must:

42.36.3.b.5.A. Permit the mast to rotate freely.

42.36.3.b.5.B. Withstand tilting and cramping caused by the guy loads.

42.36.3.b.5.C. Be secured to the mast to prevent disengagement during erection.

42.36.3.b.5.D. Be provided with means for attaching guy ropes.

42.36.3.c. Stiffleg derricks.

42.36.3.c.1. The mast must be supported in the vertical position by at least two (2) stifflegs; one end of each must be connected to the top of the mast and the other end securely anchored.

42.36.3.c.2. The stifflegs must be capable of withstanding the loads imposed at any point of operation within the load chart range.

42.36.3.c.3. The mast base must:

42.36.3.c.3.A. Permit the mast to rotate freely (when necessary).

42.36.3.c.3.B. Permit deflection of the mast without binding.

42.36.3.c.4. The mast must be prevented from lifting out of its socket when the mast is in tension.

42.36.3.c.5. The stiffleg connecting member at the top of the mast must:

42.36.3.c.5.A. Permit the mast to rotate freely (when necessary).

42.36.3.c.5.B. Withstand the loads imposed by the action of the stifflegs.

42.36.3.c.5.C. Be secured so as to oppose separating forces.

42.36.3.d. Gin pole derricks.

42.36.3.d.1. Guy lines must be sized and spaced so as to make the gin pole stable in both boomed and vertical positions. Exception: Where the size and/or spacing of guy lines do not result in the gin pole being stable in both boomed and vertical positions, the employer must ensure that the derrick is not used in an unstable position.

42.36.3.d.2. The base of the gin pole must permit movement of the pole (when necessary).

42.36.3.d.3. The gin pole must be anchored at the base against horizontal forces (when such forces are present).

42.36.3.e. Chicago boom derricks. The fittings for stepping the boom and for attaching the topping lift must be arranged to:

42.36.3.e.1. Permit the derrick to swing at all permitted operating radii and mounting heights between fittings.

42.36.3.e.2. Accommodate attachment to the upright member of the host structure.

42.36.3.e.3. Withstand the forces applied when configured and operated in accordance with the manufacturer's/builder's procedures and within its rated capacity.

42.36.3.e.4. Prevent the boom or topping lift from lifting out under tensile forces.

42.36.4. Anchoring and guying.

42.36.4.a. Load anchoring data developed by the manufacturer or a qualified person must be used.

42.36.4.b. Guy derricks.

42.36.4.b.1. The mast base must be anchored.

42.36.4.b.2. The guys must be secured to the ground or other firm anchorage.

42.36.4.b.3. The anchorage and guying must be designed to withstand maximum horizontal and vertical forces encountered when operating within rated capacity with the particular guy slope and spacing specified for the application.

42.36.4.c. Stiffleg derricks.

42.36.4.c.1. The mast base and stifflegs must be anchored.

42.36.4.c.2. The mast base and stifflegs must be designed to withstand maximum horizontal and vertical forces encountered when operating within rated capacity with the particular stiffleg spacing and slope specified for the application.

42.36.5. Swingers and hoists.

42.36.5.a. The boom, swinger mechanisms, and hoists must be suitable for the derrick work intended and must be anchored to prevent displacement from the imposed loads.

42.36.5.b. Hoists.

42.36.5.b.1. Base mounted drum hoists must meet the requirements in the following sections of ASME B30.7-2001 (incorporated by reference, see OSHA §1926.6):

42.36.5.b.1.A. Sections 7-1.1 ("Load ratings and markings").

42.36.5.b.1.B. Section 7-1.2 ("Construction"), except: 7-1.2.13 ("Operator's cab"); 7-1.2.15 ("Fire extinguishers").

42.36.5.b.1.C. Section 7-1.3 ("Installation").

42.36.5.b.1.D. Applicable terms in section 7-0.2 ("Definitions").

42.36.5.b.2. Load tests for new hoists. The employer must ensure that new hoists are load tested to a minimum of one hundred ten (110) percent of rated capacity, but not more than one hundred twenty-five (125) percent of rated capacity, unless otherwise recommended by the manufacturer. This requirement is met where the manufacturer has conducted this testing.

42.36.5.b.3. Repaired or modified hoists. Hoists that have had repairs, modifications or additions affecting their capacity or safe operation must be evaluated by a qualified person to determine if a load test is necessary. If it is, load testing must be conducted in accordance with §§36-23-42.36.5.b.2. and 36-23-42.36.5.b.4.

42.36.5.b.4. Load test procedure. Load tests required by §§36-23-42.36.5.b.2. or 36-23-42.36.5.b.3. must be conducted as follows:

42.36.5.b.4.A. The test load must be hoisted a vertical distance to assure that the load is supported by the hoist and held by the hoist brake(s).

42.36.5.b.4.B. The test load must be lowered, stopped and held with the brake(s).

42.36.5.b.4.C. The hoist must not be used unless a competent person determines that the test has been passed.

#### 42.36.6. Operational aids.

42.36.6.a. Section 36-23-42.17. (Operational aids) applies, except for §36-23-42.17.4.a. (Boom hoist limiting device), §36-23-42.17.5.a. (Boom angle or radius indicator), and §36-23-42.17.5.d. (Load weighing and similar devices).

42.36.6.b. Boom angle aid. A boom angle indicator is not required but if the derrick is not equipped with a functioning one, the employer must ensure that either:

42.36.6.b.1. The boom hoist cable must be marked with caution and stop marks. The stop marks must correspond to maximum and minimum allowable boom angles. The caution and stop marks must be in view of the operator, or a spotter who is in direct communication with the operator; or

42.36.6.b.2. An electronic or other device that signals the operator in time to prevent the boom from moving past its maximum and minimum angles, or automatically prevents such movement, is used.

#### 42.36.6.c. Load weight/capacity devices.

42.36.6.c.1. Derricks manufactured more than one year after November 8, 2010 with a maximum rated capacity over six thousand (6,000) pounds must have at least one (1) of the following: load weighing device, load moment indicator, rated capacity indicator, or rated capacity limiter. Temporary alternative measures: The weight of the load must be determined from a source recognized by the industry (such as the load's manufacturer), or by a calculation method recognized by the industry (such as calculating a steel beam from measured dimensions and a known per foot weight), or by other equally reliable means. This information must be provided to the operator prior to the lift. (See §36-23-42.18.9. for additional requirements.)

42.36.6.c.2. A load weight/capacity device that is not working properly must be repaired no later than thirty (30) days after the deficiency occurs. Exception: If the employer documents that it has ordered the necessary parts within seven (7) days of the occurrence of the deficiency, and the part is not received in time to complete the repair in thirty (30) days, the repair must be completed within seven (7) days of receipt of the parts.

#### 42.36.7. Post-assembly approval and testing--new or reinstalled derricks.

42.36.7.a. Anchorages.

42.36.7.a.1. Anchorages, including the structure to which the derrick is attached (if applicable), must be approved by a qualified person.

42.36.7.a.2. If using a rock or hairpin anchorage, the qualified person must determine if any special testing of the anchorage is needed. If so, it must be tested accordingly.

42.36.7.b. Functional test. Prior to initial use, new or reinstalled derricks must be tested by a competent person with no hook load to verify proper operation. This test must include:

42.36.7.b.1. Lifting and lowering the hook(s) through the full range of hook travel.

42.36.7.b.2. Raising and lowering the boom through the full range of boom travel.

42.36.7.b.3. Swinging in each direction through the full range of swing.

42.36.7.b.4. Actuating the anti two-block and boom hoist limit devices (if provided).

42.36.7.b.5. Actuating locking, limiting and indicating devices (if provided).

42.36.7.c. Load test. Prior to initial use, new or reinstalled derricks must be load tested by a competent person. The test load must meet the following requirements:

42.36.7.c.1. Test loads must be at least one hundred (100) percent and no more than one hundred ten (110) percent of the rated capacity, unless otherwise recommended by the manufacturer or qualified person, but in no event must the test load be less than the maximum anticipated load.

42.36.7.c.2. The test must consist of:

42.36.7.c.2.A. Hoisting the test load a few inches and holding to verify that the load is supported by the derrick and held by the hoist brake(s).

42.36.7.c.2.B. Swinging the derrick, if applicable, the full range of its swing, at the maximum allowable working radius for the test load.

42.36.7.c.2.C. Booming the derrick up and down within the allowable working radius for the test load.

42.36.7.c.2.D. Lowering, stopping and holding the load with the brake(s).

42.36.7.c.3. The derrick must not be used unless the competent person determines that the test has been passed.

42.36.7.d. Documentation. Tests conducted under this paragraph must be documented. The document must contain the date, test results and the name of the tester. The document must be retained until the derrick is re-tested or dismantled, whichever occurs first. All such documents must be available, during the applicable document retention period, to all persons who conduct inspections in accordance with §36-23-42.13.

42.36.8. Load testing repaired or modified derricks. Derricks that have had repairs, modifications or additions affecting the derrick's capacity or safe operation must be evaluated by a qualified person to determine if a load test is necessary. If it is, load testing must be conducted and documented in accordance with §36-23-42.36.7.

42.36.9. Power failure procedures. If power fails during operations, the derrick operator must safely stop operations. This must include:

42.36.9.a. Setting all brakes or locking devices.

42.36.9.b. Moving all clutch and other power controls to the off position.

42.36.10. Use of winch heads.

42.36.10.a. Ropes must not be handled on a winch head without the knowledge of the operator.

42.36.10.b. While a winch head is being used, the operator must be within reach of the power unit control lever.

42.36.11. Securing the boom.

42.36.11.a. When the boom is being held in a fixed position, dogs, pawls, or other positive holding mechanisms on the boom hoist must be engaged.

42.36.11.b. When taken out of service for thirty (30) days or more, the boom must be secured by one (1) of the following methods:

42.36.11.b.1. Laid down.

42.36.11.b.2. Secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block.

42.36.11.b.3. For guy derricks, lifted to a vertical position and secured to the mast.

42.36.11.b.4. For stiffleg derricks, secured against the stiffleg.

42.36.12. The process of jumping the derrick must be supervised by the A/D director.

42.36.13. Derrick operations must be supervised by a competent person.

42.36.14. Inspections. In addition to the requirements in §36-23-42.13., the following additional items must be included in the inspections:

42.36.14.a. Daily: Guys for proper tension.

42.36.14.b. Annual.

42.36.14.b.1. Gudgeon pin for cracks, wear, and distortion.

42.36.14.b.2. Foundation supports for continued ability to sustain the imposed loads.

42.36.15. Qualification and Training. The employer must train each operator of a derrick on the safe operation of equipment the individual will operate. Section 36-23-42.28. (operator qualification and certification) does not apply.

42.37. Floating cranes/derricks and land cranes/derricks on barges.

42.37.1. This Section contains supplemental requirements for floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation (i.e., vessel/flotation device). The requirements of this Section apply to floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation, unless specified otherwise. The requirements of this Section do not apply when using jacked barges when the jacks are deployed to the river, lake, or sea bed and the barge is fully supported by the jacks.

42.37.2. General requirements. The requirements in §§36-23-42.37.3. through 36-23-42.37.10. apply to both floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation.

42.37.3. Work area control.

42.37.3.a. The requirements of §36-23-42.25. (work area control) apply, except for §36-23-42.25.1.b.2.

42.37.3.b. The employer must either:

42.37.3.b.1. Erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard areas; or

42.37.3.b.2. Clearly mark the hazard areas by a combination of warning signs (such as, "Danger-Swing/Crush Zone") and high visibility markings on the equipment that identify the hazard areas. In addition, the employer must train each employee to understand what these markings signify.

42.37.4. Keeping clear of the load. Section 36-23-42.26. does not apply.

42.37.5. Additional safety devices. In addition to the safety devices listed in §36-23-42.16., the following safety devices are required:

42.37.5.a. Barge, pontoon, vessel or other means of flotation list and trim device. The safety device must be located in the cab or, when there is no cab, at the operator's station.

42.37.5.b. Positive equipment house lock.

42.37.5.c. Wind speed and direction indicator. A competent person must determine if wind is a factor that needs to be considered; if wind needs to be considered, a wind speed and direction indicator must be used.

42.37.6. Operational aids.

42.37.6.a. An anti two-block device is required only when hoisting personnel or hoisting over an occupied cofferdam or shaft.

42.37.6.b. Subdivision 36-23-42.17.5.d. (load weighing and similar devices) does not apply to dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, and pile driving work performed under this Section.

42.37.7. Accessibility of procedures applicable to equipment operation. If the crane/derrick has a cab, the requirements of §36-23-42.18.3. apply. If the crane/derrick does not have a cab, the employer must ensure that:

42.37.7.a. Rated capacities (load charts) are posted at the operator's station. If the operator's station is moveable (such as with pendant-controlled equipment), the load charts are posted on the equipment.

42.37.7.b. Procedures applicable to the operation of the equipment (other than load charts), recommended operating speeds, special hazard warnings, instructions and operators manual, must be readily available on board the vessel/flotation device.

42.37.8. Inspections. In addition to meeting the requirements of §36-23-42.13. for inspecting the crane/derrick, the employer must inspect the barge, pontoons, vessel or other means of flotation used to support a floating crane/derrick or land crane/derrick, and ensure that:

42.37.8.a. Shift. For each shift inspection, the means used to secure/attach the equipment to the vessel/flotation device is in proper condition, including wear, corrosion, loose or missing fasteners, defective welds, and (when applicable) insufficient tension.

42.37.8.b. Monthly. For each monthly inspection:

42.37.8.b.1. The means used to secure/attach the equipment to the vessel/flotation device is in proper condition, including inspection for wear, corrosion, and, when applicable, insufficient tension.

42.37.8.b.2. The vessel/flotation device is not taking on water.

42.37.8.b.3. The deckload is properly secured.

42.37.8.b.4. The vessel/flotation device is watertight based on the condition of the chain lockers, storage, fuel compartments, and hatches

42.37.8.b.5. The firefighting and lifesaving equipment is in place and functional.

42.37.8.c. The shift and monthly inspections are conducted by a competent person, and:

42.37.8.c.1. If any deficiency is identified, an immediate determination is made by a qualified person whether the deficiency constitutes a hazard.

42.37.8.c.2. If the deficiency is determined to constitute a hazard, the vessel/flotation device is removed from service until the deficiency has been corrected.

42.37.8.d. Annual: external vessel/flotation device inspection. For each annual inspection: OSHA §1926.1437(h)(4)(i).

42.37.8.d.1. The external portion of the barge, pontoons, vessel or other means of flotation used is inspected annually by a qualified person who has expertise with respect to vessels/flotation devices and that the inspection includes the following items:

42.37.8.d.1.A. The items identified in §36-23-42.37.8.a. (shift) and §36-23-42.37.8.b. (monthly).

42.37.8.d.1.B. Cleats, bitts, chocks, fenders, capstans, ladders, and stanchions, for significant corrosion, wear, deterioration, or deformation that could impair the function of these items.

42.37.8.d.1.C. External evidence of leaks and structural damage; evidence of leaks and damage below the waterline may be determined through internal inspection of the vessel/flotation device.

42.37.8.d.1.D. Four-corner draft readings.

42.37.8.d.1.E. Firefighting equipment for serviceability.

42.37.8.d.2. Rescue skiffs, lifelines, work vests, life preservers and ring buoys are inspected for proper condition.

42.37.8.d.3. If any deficiency is identified, an immediate determination is made by the qualified person whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly inspections.

42.37.8.d.3.A. If the qualified person determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected. (See requirements in §36-23-42.18.6.)

42.37.8.d.3.B. If the qualified person determines that, though not presently a hazard, the deficiency needs to be monitored, the deficiency is checked in the monthly inspections.

42.37.8.e. Four-year: internal vessel/flotation device inspection. For each four-year inspection:

42.37.8.e.1. A marine engineer, marine architect, licensed surveyor, or other qualified person who has expertise with respect to vessels/flotation devices surveys the internal portion of the barge, pontoons, vessel, or other means of flotation.

42.37.8.e.2. If the surveyor identifies a deficiency, an immediate determination is made by the surveyor as to whether the deficiency constitutes a hazard or, though not yet a hazard, needs to be monitored in the monthly or annual inspections, as appropriate.

42.37.8.e.2.A. If the surveyor determines that the deficiency constitutes a hazard, the vessel/flotation device is removed from service until it has been corrected.

42.37.8.e.2.B. If the surveyor determines that, though not presently a hazard, the deficiency needs to be monitored, the deficiency is checked in the monthly or annual inspections, as appropriate.

42.37.8.f. Documentation. The monthly and annual inspections required in §§36-23-42.37.8.b. and 36-23-42.37.8.d. are documented in accordance with §§36-23-42.13.5.c. and 36-23-42.13.6.g., respectively, and that the four (4) year inspection required in §36-23-43.37.8.e. is documented in accordance with §36-23-42.13.6.g., except that the documentation for that inspection must be retained for a minimum of four (4) years. All such documents must be made available, during the applicable document retention period, to all persons who conduct inspections in accordance with §36-23-42.13.

42.37.9. Working with a diver. The employer must meet the following additional requirements when working with a diver in the water:

42.37.9.a. If a crane/derrick is used to get a diver into and out of the water, it must not be used for any other purpose until the diver is back on board. When used for more than one (1) diver, it must not be used for any other purpose until all divers are back on board.

42.37.9.b. The operator must remain at the controls of the crane/derrick at all times.

42.37.9.c. In addition to the requirements in §§36-23-42.20. through 36-23-42.23. (signals), either:

42.37.9.c.1. A clear line of sight must be maintained between the operator and tender; or

42.37.9.c.2. The signals between the operator and tender must be transmitted electronically.

42.37.9.d. The means used to secure the crane/derrick to the vessel/flotation device (see §36-23-42.37.12.e.) must not allow any amount of shifting in any direction.

42.37.10. Manufacturer's specifications and limitations.

42.37.10.a. The employer must ensure that the barge, pontoons, vessel, or other means of flotation must be capable of withstanding imposed environmental, operational and in-transit loads when used in accordance with the manufacturer's specifications and limitations.

42.37.10.b. The employer must ensure that the manufacturer's specifications and limitations with respect to environmental, operational, and in-transit loads for a barge, pontoon, vessel, or other means of flotation are not exceeded or violated.

42.37.10.c. When the manufacturer's specifications and limitations are unavailable, the employer must ensure that the specifications and limitations established by a qualified person with respect to environmental, operational and in-transit loads for the barge, pontoons, vessel, or other means of flotation are not exceeded or violated.

42.37.11. Floating cranes/derricks. For equipment designed by the manufacturer (or employer) for marine use by permanent attachment to barges, pontoons, vessels or other means of flotation:

42.37.11.a. Load charts.

42.37.11.a.1. The employer must not exceed the manufacturer load charts applicable to operations on water. When using these charts, the employer must comply with all parameters and limitations (such as dynamic and environmental parameters) applicable to the use of the charts.

42.37.11.a.2. The employer must ensure that load charts take into consideration a minimum wind speed of forty (40) miles per hour.

42.37.11.b. The employer must ensure that the requirements for maximum allowable list and maximum allowable trim as specified in Table 36-23O are met.

Table 36-23O

<u>Rated capacity</u>	<u>Maximum allowable list (degrees)</u>	<u>Maximum allowable trim (degrees)</u>
<u>Equipment designed for marine use by permanent attachment (other than derricks):</u>		
<u>25 tons or less</u>	<u>5</u>	<u>5</u>
<u>Over 25 tons</u>	<u>7</u>	<u>7</u>
<u>Derricks designed for marine use by permanent attachment:</u>		
<u>Any rated capacity</u>	<u>10</u>	<u>10</u>

42.37.11.c. The employer must ensure that the equipment is stable under the conditions specified in Tables 36-23P and 36-23Q. (Note: Freeboard is the vertical distance between the water line and the main deck of the vessel.)

Table 36-23P

<u>Operated at</u>	<u>Wind speed (mph)</u>	<u>Minimum freeboard (ft)</u>
<u>Rated capacity</u>	<u>60</u>	<u>2</u>
<u>Rated capacity plus 25%</u>	<u>60</u>	<u>1</u>
<u>High boom, no load</u>	<u>60</u>	<u>2</u>

Table 36-23Q

<u>Operated at</u>	<u>Wind speed</u>
<u>For backward stability of the boom:</u>	
<u>High boom, no load, full back list (least stable condition)</u>	<u>90 mph</u>

42.37.11.d. If the equipment is employer-made, it must not be used unless the employer has documents demonstrating that the load charts and applicable parameters for use meet the requirements

of §§36-23-42.37.11.a. through 36-23-42.37.11.c. Such documents must be signed by a registered professional engineer who is a qualified person with respect to the design of this type of equipment (including the means of flotation).

42.37.11.e. The employer must ensure that the barge, pontoons, vessel or other means of flotation used:

42.37.11.e.1. Are structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick's maximum rated capacity with all planned and actual deck loads and ballasted compartments.

42.37.11.e.2. Have a subdivided hull with one or more longitudinal watertight bulkheads for reducing the free-surface effect.

42.37.11.e.3. Have access to void compartments to allow for inspection and pumping.

42.37.12. Land cranes/derricks. For land cranes/derricks used on barges, pontoons, vessels or other means of flotation, the employer must ensure that:

42.37.12.a. The rated capacity of the equipment (including but not limited to modification of load charts) applicable for use on land is reduced to:

42.37.12.a.1. Account for increased loading from list, trim, wave action, and wind.

42.37.12.a.2. Be applicable to a specified location(s) on the specific barge, pontoons, vessel or other means of flotation that will be used, under the environmental conditions expected and encountered.

42.37.12.a.3. The conditions required in §§36-23-42.37.12.c. and 36-23-42.37.12.d. are met.

42.37.12.b. The rated capacity modification required in §36-23-42.37.12.a. is performed by the equipment manufacturer, or a qualified person who has expertise with respect to both land crane/derrick capacity and the stability of vessels/flotation devices.

42.37.12.c. For list and trim.

42.37.12.c.1. The maximum allowable list and the maximum allowable trim for the barge, pontoon, vessel or other means of flotation must not exceed the amount necessary to ensure that the conditions in §36-23-42.37.12.d. are met. In addition, the maximum allowable list and the maximum allowable trim does not exceed the least of the following: Five (5) degrees, the amount specified by the crane/derrick manufacturer, or, when, an amount is not so specified, the amount specified by the qualified person.

42.37.12.c.2. The maximum allowable list and the maximum allowable trim for the land crane/derrick does not exceed the amount specified by the crane/derrick manufacturer, or, when, an amount is not so specified, the amount specified by the qualified person.

42.37.12.d. For the following conditions:

42.37.12.d.1. All deck surfaces of the barge, pontoons, vessel or other means of flotation used are above water.

42.37.12.d.2. The entire bottom area of the barge, pontoons, vessel or other means of flotation used is submerged.

42.37.12.e. Physical attachment, corraling, rails system and centerline cable system meet the

requirements in Option (1), Option (2), Option (3), or Option (4) of this Section, and that whichever option is used also meets the requirements of §36-23-42.37.12.e.5.

42.37.12.e.1. Option (1)-Physical attachment. The crane/derrick is physically attached to the barge, pontoons, vessel or other means of flotation. Methods of physical attachment include crossed-cable systems attached to the crane/derrick and vessel/flotation device, bolting or welding the crane/derrick to the vessel/flotation device, strapping the crane/derrick to the vessel/flotation device with chains, or other methods of physical attachment.

42.37.12.e.2. Option (2)-Corralling. The crane/derrick is prevented from shifting by installing barricade restraints (i.e., a corralling system). Employers must ensure that corralling systems do not allow the equipment to shift by any amount of shifting in any direction.

42.37.12.e.3. Option (3)-Rails. The crane/derrick must be prevented from shifting by being mounted on a rail system. Employers must ensure that rail clamps and rail stops are used unless the system is designed to prevent movement during operation by other means.

42.37.12.e.4. Option (4)-Centerline cable system. The crane/derrick is prevented from shifting by being mounted to a wire rope system. The employer must ensure that the wire rope system meets the following requirements:

42.37.12.e.4.A. The wire rope and attachments are of sufficient size and strength to support the side load of crane/derrick.

42.37.12.e.4.B. The wire rope is attached physically to the vessel/flotation device.

42.37.12.e.4.C. The wire rope is attached to the crane/derrick by appropriate attachment methods (such as shackles or sheaves) on the undercarriage, and that the method used will allow the crew to secure the crane/derrick from movement during operation and to move the crane/derrick longitudinally along the vessel/flotation device for repositioning.

42.37.12.e.4.D. Means are installed to prevent the crane/derrick from passing the forward or aft end of the wire rope attachments.

42.37.12.e.4.E. The crane/derrick is secured from movement during operation.

42.37.12.e.5. The systems/means used to comply with Option (1), Option (2), Option (3), or Option (4) of this section are designed by a marine engineer, registered professional engineer familiar with floating crane/derrick design, or qualified person familiar with floating crane/derrick design.

42.37.12.f. Exception. For mobile auxiliary cranes used on the deck of a floating crane/derrick, the requirement specified by §36-23-42.37.12.e. to use Option (1), Option (2), Option (3), or Option (4) does not apply when the employer demonstrates implementation of a plan and procedures that meet the following requirements:

42.37.12.f.1. A marine engineer or registered professional engineer familiar with floating crane/derrick design develops and signs a written plan for the use of the mobile auxiliary crane.

42.37.12.f.2. The plan is designed so that the applicable requirements of this Section are met despite the position, travel, operation, and lack of physical attachment (or corralling, use of rails or cable system) of the mobile auxiliary crane.

42.37.12.f.3. The plan specifies the areas of the deck where the mobile auxiliary crane is permitted to be positioned, travel, and operate, and the parameters and limitations of such movements and operation.

42.37.12.f.4. The deck is marked to identify the permitted areas for positioning, travel,

and operation.

42.37.12.f.5. The plan specifies the dynamic and environmental conditions that must be present for use of the plan.

42.37.12.f.6. If the dynamic and environmental conditions in §36-23-42.37.12.f.5. are exceeded, the mobile auxiliary crane is attached physically or corralled in accordance with Option (1), Option (2) or Option (4) of §36-23-42.37.12.

42.37.12.g. The barge, pontoons, vessel or other means of flotation used:

42.37.12.g.1. Are structurally sufficient to withstand the static and dynamic loads of the crane/derrick when operating at the crane/derrick's maximum rated capacity with all anticipated deck loads and ballasted compartments.

42.37.12.g.2. Have a subdivided hull with one (1) or more longitudinal watertight bulkheads for reducing the free surface effect.

42.37.12.g.3. Have access to void compartments to allow for inspection and pumping.

42.38. Overhead and gantry cranes.

42.38.1. Permanently installed overhead and gantry cranes. The requirements of OSHA §1910.179, except for §1910.179(b)(1), and not the requirements of §36-23-42.38., apply to the following equipment when used in construction and permanently installed in a facility: overhead and gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics.

42.38.2. Overhead and gantry cranes that are not permanently installed in a facility.

42.38.2.a. This Subsection applies to the following equipment when used in construction and not permanently installed in a facility: Overhead and gantry cranes, overhead/bridge cranes, semigantry, cantilever gantry, wall cranes, storage bridge cranes, launching gantry cranes, and similar equipment having the same fundamental characteristics, irrespective of whether it travels on tracks, wheels, or other means.

42.38.2.b. The following requirements apply to equipment identified in §36-23-42.38.2.a. :

42.38.2.b.1. Sections 36-23-42.1. through 36-23-42.16.; §§36-23-42.18 through 36-23-42.26.; §36-23-42.27.4., §§36-23-42.28 through 36-23-42.34.; §36-23-42.37., §§36-23-42.39. and 36-23-42.41.

42.38.2.b.2. The following portions of OSHA §1910.179:

42.38.2.b.2.A. Paragraphs (b)(5),(6),(7); (e)(1),(3),(5),(6); (f)(1),(4); (g); (h)(1),(3); (k); and (n) of OSHA §1910.179.

42.38.2.b.2.B. The definitions in OSHA §1910.179(a) except for "hoist" and "load." For those words, the definitions in §36-23-42.1. apply.

42.38.2.b.2.C. OSHA §1910.179(b)(2), but only where the equipment identified in §36-23-42.38.2.a. was manufactured before September 19, 2001.

42.38.2.b.3. For equipment manufactured on or after September 19, 2001, the following sections of ASME B30.2-2005 (incorporated by reference, see OSHA §1926.6) apply: 2-1.3.1; 2-1.3.2; 2-1.4.1; 2-1.6; 2-1.7.2; 2-1.8.2; 2-1.9.1; 2-1.9.2; 2-1.11; 2-1.12.2; 2-1.13.7; 2-1.14.2; 2-1.14.3; 2-1.14.5; 2-1.15.; 2-2.2.2; 2-3.2.1.1. In addition, 2-3.5 applies, except in 2-3.5.1(b), "29 CFR 1910.147" is substituted

for "ANSI Z244.1."

42.39. Dedicated pile drivers.

42.39.1. The provisions of §36-23-42. apply to dedicated pile drivers, except as specified in this Section.

42.39.2. Section 36-23-42.17.4.c. (anti two-blocking device) does not apply.

42.39.3. Section 36-23-42.17.5.b. (Load weighing and similar devices) applies only to dedicated pile drivers manufactured after November 8, 2011.

42.39.4. For equipment manufactured on or after September 19, 2001, the following sections of ASME B30.2-2005 (incorporated by reference, see OSHA §1926.6) apply: 2-1.3.1; 2-1.3.2; 2-1.4.1; 2-1.6; 2-1.7.2; 2-1.8.2; 2-1.9.1; 2-1.9.2; 2-1.11; 2-1.12.2; 2-1.13.7; 2-1.14.2; 2-1.14.3; 2-1.14.5; 2-1.15.; 2-2.2.2; 2-3.2.1.1. In addition, 2-3.5 applies, except in 2-3.5.1(b), "29 CFR 1910.147" is substituted for "ANSI Z244.1."

42.40. Sideboom cranes.

42.40.1. The provisions of §36-23-42. apply, except §36-23-42.3. (ground conditions), §36-23-42.16. (safety devices), §36-23-42.17. (operational aids), and §36-23-42.28. (operator qualification and certification).

42.40.2. Section 36-23-42.27. (free fall and controlled load lowering) applies, except §36-23-42.27.1.b.1. Sideboom cranes in which the boom is designed to free fall (live boom) are permitted only if manufactured prior to November 8, 2010.

42.40.3. Sideboom cranes mounted on wheel or crawler tractors must meet all of the following requirements of ASME B30.14-2004 (incorporated by reference, see OSHA §1926.6):

42.40.3.a. Section 14-1.1 ("Load Ratings").

42.40.3.b. Section 14-1.3 ("Side Boom Tractor Travel").

42.40.3.c. Section 14-1.5 ("Ropes and Reeving Accessories").

42.40.3.d. Section 14-1.7.1 ("Booms").

42.40.3.e. Section 14-1.7.2 ("General Requirements--Exhaust Gases").

42.40.3.f. Section 14-1.7.3 ("General Requirements--Stabilizers (Wheel-Type Side Boom Tractors)").

42.40.3.g. Section 14-1.7.4 ("General Requirements--Welded Construction").

42.40.3.h. Section 14-1.7.6 ("General Requirements--Clutch and Brake Protection").

42.40.3.i. Section 14-2.2.2 ("Testing--Rated Load Test"), except that it applies only to equipment that has been altered or modified.

42.40.3.j. In section 14-3.1.2 ("Operator Qualifications"), paragraph (a), except the phrase "When required by law."

42.40.3.k. In section 14-3.1.3 ("Operating Practices"), paragraphs (e), (f)(1)--(f)(4), (f)(6), (f)(7), (h), and (i).

42.40.3.l. In section 14-3.2.3 ("Moving the Load"), paragraphs (i), (l), and (m).

42.41. Equipment with a rated hoisting/lifting capacity of two thousand (2,000) pounds or less.

42.41.1. The following paragraphs of this Section specify requirements for employers using equipment with a maximum rated hoisting/lifting capacity of two thousand (2,000) pounds or less.

42.41.2. The employer using this equipment must comply with the following provisions of this rule: §36-23-42.1. (definitions); §36-23-42.3. (ground conditions); §36-23-42.4. (assembly/disassembly--selection of manufacturer or employer procedures); §36-23-42.7. (assembly/disassembly--employer procedures); §§36-23-42.8. through 36-23-42.12. (power line safety); §36-23-42.13.3. (post-assembly); §§36-23-42.14. through 36-23-42.15. (wire rope); §36-23-42.19. (authority to stop operation); §§36-23-42.20. through 36-23-42.23. (signals); §36-23-42.24. (fall protection); §36-23-42.26. (keeping clear of the load) (except for §36-23-42.26.3.c. (qualified rigger)); §36-23-42.27. (free fall and controlled load lowering); §36-23-42.32. (multiple crane/derrick lifts--supplemental requirements); §36-23-42.34. (equipment modifications); §36-23-42.35. (tower cranes); §36-23-42.36. (derricks); §36-23-42.37. (floating cranes/derricks and land cranes/derricks on barges); §36-23-42.38. (overhead & gantry cranes).

42.41.3. Assembly/disassembly.

42.41.3.a. In addition to compliance with §36-23-42.4. (assembly/disassembly--selection of manufacturer or employer procedures) and §36-23-42.7. (assembly/disassembly--employer procedures), the employer must also comply with §§36-23-42.41.3.b. and 36-23-42.41.3.c.

42.41.3.b. Components and configuration. The employer must ensure that:

42.41.3.b.1. The selection of components, and the configuration of the equipment, that affect the capacity or safe operation of the equipment complies with either the:

42.41.3.b.1.A. Manufacturer instructions, recommendations, limitations, and specifications. When these documents and information are unavailable, a registered professional engineer familiar with the type of equipment involved must approve, in writing, the selection and configuration of components; or

42.41.3.b.1.B. Approved modifications that meet the requirements of §36-23-42.34. (equipment modifications).

42.41.3.b.2. Post-assembly inspection. Upon completion of assembly, the equipment is inspected to ensure that it is in compliance with §36-23-42.41.3.b.1. (see §36-23-42.13.3. for post-assembly inspection requirements).

42.41.3.c. Manufacturer prohibitions. The employer must comply with applicable manufacturer prohibitions.

42.41.4. Operation--procedures.

42.41.4.a. The employer must comply with all manufacturer procedures applicable to the operational functions of the equipment, including its use with attachments.

42.41.4.b. Unavailable operation procedures. The employer must:

42.41.4.b.1. When the manufacturer's procedures are unavailable, develop, and ensure compliance with, all procedures necessary for the safe operation of the equipment and attachments.

42.41.4.b.2. Ensure that procedures for the operational controls are developed by a qualified person.

42.41.4.b.3. Ensure that procedures related to the capacity of the equipment are

developed and signed by a registered professional engineer familiar with the equipment.

42.41.4.c. Accessibility. The employer must ensure that:

42.41.4.c.1. The load chart is available to the operator at the control station;

42.41.4.c.2. Procedures applicable to the operation of the equipment, recommended operating speeds, special hazard warnings, instructions, and operator's manual are readily available for use by the operator.

42.41.4.c.3. When rated capacities are available at the control station only in electronic form and a failure occurs that makes the rated capacities inaccessible, the operator immediately ceases operations or follows safe shut-down procedures until the rated capacities (in electronic or other form) are available.

42.41.5. Safety devices and operational aids.

42.41.5.a. The employer must ensure that safety devices and operational aids that are part of the original equipment are maintained in accordance with manufacturer procedures.

42.41.5.b. Anti two-blocking. The employer must ensure that equipment covered by this section manufactured more than one (1) year after November 8, 2010 have either an anti two-block device that meets the requirements of §36-23-42.17.4.c., or is designed so that, in the event of a two-block situation, no damage or load failure will occur (for example, by using a power unit that stalls in response to a two-block situation).

42.41.6. Operator qualifications. The employer must train each operator, prior to operating the equipment, on the safe operation of the type of equipment the operator will be using.

42.41.7. Signal person qualifications. The employer must train each signal person in the proper use of signals applicable to the use of the equipment.

42.41.8. Inspections. The employer must ensure that equipment is inspected in accordance with manufacturer procedures.

42.41.9. Hoisting personnel. The employer must ensure that equipment covered by this Section is not used to hoist personnel.

42.41.10. Design. The employer must ensure that the equipment is designed by a qualified engineer.